CHAPTER 6

Development and Implementation of the LAPTEL Model

6.1 Introduction

This chapter discusses and describes the development and implementation (delivery) of a WebCT-based blended learning environment based on the theoretically designed LAPTEL framework (Chapter 5). It was built upon the theoretical framework presented in Chapter 2, and the instructional design principles appropriate for developing web-based blended learning environments (Chapter 3). Its actual development was based on the discussions in Section 5.8.2.1: *The design of a blended learning environment based on LAPTEL model.* Conceptually, this Chapter has been a drawing board as well as a launching pad for transforming theory into practice or specifically for developing a prototype for addressing the research question, "*How can a web-based blended learning environment be designed, developed and implemented at the University of Botswana?"* Subsequently, a prototype course based on the LAPTEL model was developed to pilot it in order to refine the model before subjecting it to another run meant to finally evaluate how effective the LAPTEL model was and to determine whether the aim of the study was achieved. The chapter provides details of all data gathered from the two studies and finally a summary of all findings.

6.2 The design and development phase

The first stage in any curriculum development is a situational analysis which in this case is a learner profile analysis as discussed in Section 5.8.2.1. The subjects of this study were second year BSc Biology students in their third out of a total of eight semesters.

The topic selected for this study is 'Cloning' in their Genetic Engineering course in Biology. The design plan below in Table 6.1 also formed a storyboard for the tutorial development. The storyboard is a plan for developing teaching and learning activities; it links the design phase and the development of the course tutorial. It focuses on the expected learning objectives, the assessment methods to determine when and whether

learners have achieved the objectives, and the appropriate strategies to support learners (development of learning tasks) to achieve those objectives. Since this plan displays strategies and ideas out in the open, other team members can easily review them. The storyboard together with a lesson plan and the learning tasks / materials assists learners to achieve the course goals.

6.2.1: The Design plan / document: Essential course content elements for hybrid Instruction

Theme: Cloning

Lesson Goal: To introduce students to the concept of cloning, the history of cloning technologies, uses and risks of cloning, issues around cloning, and other related issues that include ethical issues.

Table 6.1: Essential Course/content elements for hybrid Instruction

Pre-determined Content Topic	**Learning objectives**	**Assessment methods**	**Instructional Activities/ Strategies**	
			Online	**Face-to-face**
1. Advance organiser	To activate students' existing knowledge of DNA, or deoxyribonucleic acid.	• Self-test 1 (Online quiz on DNA)	• A short inviting write up and a forum for self introduction in order to create a social climate that instilled trust in learners to interact each other. • An overview of DNA in Study Guide #1 available at: www.moundstreet.k12.oh.us/6060701019103839/lib/6060701019103839/_files/35_-_Genetic_Engineering.pdf • A discussion forum on DNA • Glossary • FAQ • Summary	
2. An introduction to genetic engineering in general	To recognize cloning in biology as the process of producing copies of DNA or populations of genetically-identical individuals	• Self-test 2	• Online Tutorial materials; • A discussion forum on genetic engineering • Further reading: Study Guide #2 • Summary	• A summary of introduction to genetic engineering to reinforce student understanding from online reading and discussions; • Further discussion of abstract concepts, if any.
3. Genetic engineering in different organisms:	To explain the possibility of genetic engineering in different organisms	• Self-test 3 (Online quiz available at: http://nature.ca/geno	• Online Tutorial materials; • A discussion forum on genetic engineering in different organisms • Further reading: Study Guide #3, 4, 5 and 6.	

- in microbes - in plants - in animals - in humans		me/04/041/factorfake_e.swf	• Summary	
4. The cloning technologies	• To review the evolution of cloning technologies	• Self-test 4 • Based on the experience in the interactive model, list the stages involved in cloning.	• Online Tutorial materials: (i) recombinant DNA technology or DNA cloning, (ii) reproductive cloning, and (iii) therapeutic cloning. Online tutorials Interactive experience with cloning available at: 1) http://learn.genetics.utah.edu/content/tech/cloning/clickandclone/ 2) http://highered.mcgraw-hill.com/sites/0072556781/student_view0/chapter14/animation_quiz_1.html • A discussion forum on cloning technologies; • Individual feed back from Course Tutor to students with queries or those who seem to be needing help; • Summary	• Opportunity to go over any missed answers and to discuss abstract concepts, if any; • Particular mention of Dolly the sheep and human cloning under reproductive cloning.
5. Issues around cloning	• To explore and evaluate: - the reasons for using cloning technologies; - cloning extinct and endangered species; - the risks of cloning. • To review the ethical issues of cloning.	• To write a reflection on the issues around reproductive cloning that includes its ethical concerns and submit it online to the tutor.	• Online discussion forums and chat sessions on issues around cloning- to explore the myths and facts of cloning; • Online links to current information about cloning for further reading. • Summary	• Further discussion of any important points from the online discussions / Chat for clarification; • A summary and conclusion of all expected aspects of cloning.

6.2.2 Media and materials development

All the course materials were developed in line with the design plan as shown above in Table 6.1., and the various stages of blended course design discussed in Sections 5.8.2.1, and 5.8.2.2.

The Course Tutor who was a subject matter expert (SME) provided with the course synopsis, list of expected learning objectives, an outline of the content to be used along with the entire content, and the possible assessment methods relevant to the objectives. He ensured that the content was relevant, and current. Based on the content outline, the Instructional Designer (who is also the Researcher in this study) then analysed and organised the content by sequencing the main concepts in a manner that will be easy to follow and appealing to the learners. Further, the Researcher ensured that all materials were in accordance with the correct design plan. All materials were in digital format, and therefore, it was ready to upload it onto WebCT. All design criteria discussed in 5.8.2 and 5.8.2.1 particularly the usability and simplicity of design were given a special attention in the creation of the course website.

For good curriculum planning and development, it is critical that all tasks / activities and assessments are linked directly to the envisaged learning objectives; therefore, the Researcher and the SME worked in a collaborative manner, supporting each other. They jointly established the assessment criteria that specified the level of performance in terms of the expected skills, knowledge and attitudes. In the process, criterion referenced tests (CRT)[1] were developed by the Course Tutor; it was ensured that each test item was directly linked to one or more of the performance objectives; in the case of self tests, there was provision for adequate feedback that contributed towards learners' understanding as well as their level of motivation. It was also ensured that all assignments and tests were learning centred (see sample self tests in Appendix K).

In some other contexts, it might require multimedia presentations and simulations in which case support from media developers and graphic designers would be sought for in their development as well as uploading. All course materials including assessments and class lists were uploaded to WebCT by the Media Developer who also assisted in making copies of all the learning materials on a CD-ROM or flash memory for

[1] *The process of matching questions to objectives is termed criterion-based testing. This is critical to evaluate whether the instruction was successful.*

students to use them off line in case WebCT was not accessible at some point in time during the piloting.

As the Course Tutor did not have the required background or experience of learning design, the Researcher was with him throughout the course to design, develop and make changes, if required, immediately without perturbing instructional processes. The media developer was also available on call to provide just-in-time support.

The following screenshots are from the WebCT platform after all the materials have been uploaded.

i) The WebCT log in

Students can access any course on WebCT only through log in page as shown below in Fig. 6.1. This means that students can log in to WebCT only if they have access rights given to them by the WebCT Administrator.

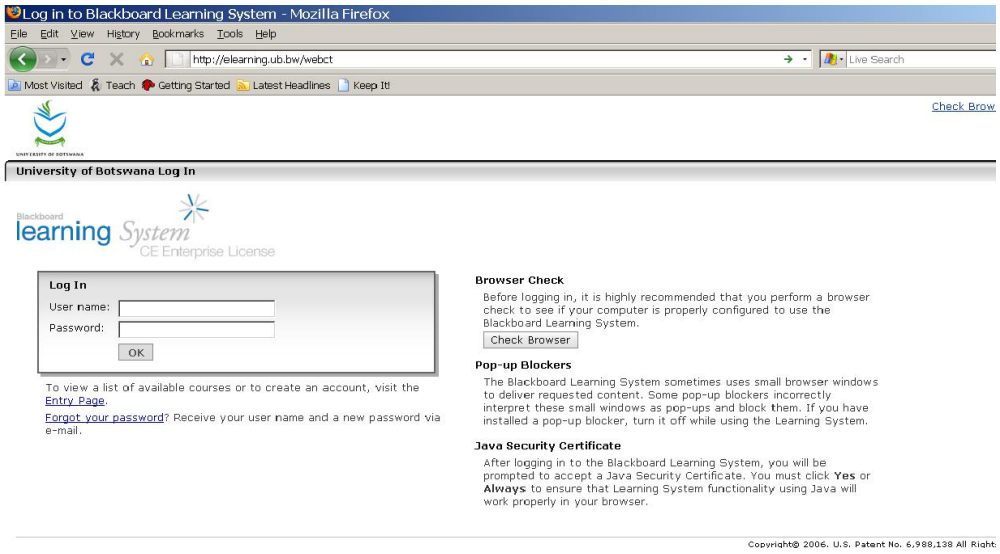

Figure 6.1: The WebCT log in page

ii) The course homepage

Homepage is the page that students will find upon logging into WebCT. A typical homepage is shown below in Fig. 6.2. There are three files and four folders in the homepage. One of the files entitled, 'Welcome message: Start here' contains a

welcome message which aims to provide opportunity for interaction among students as well as with the tutor, and to establish a social climate.

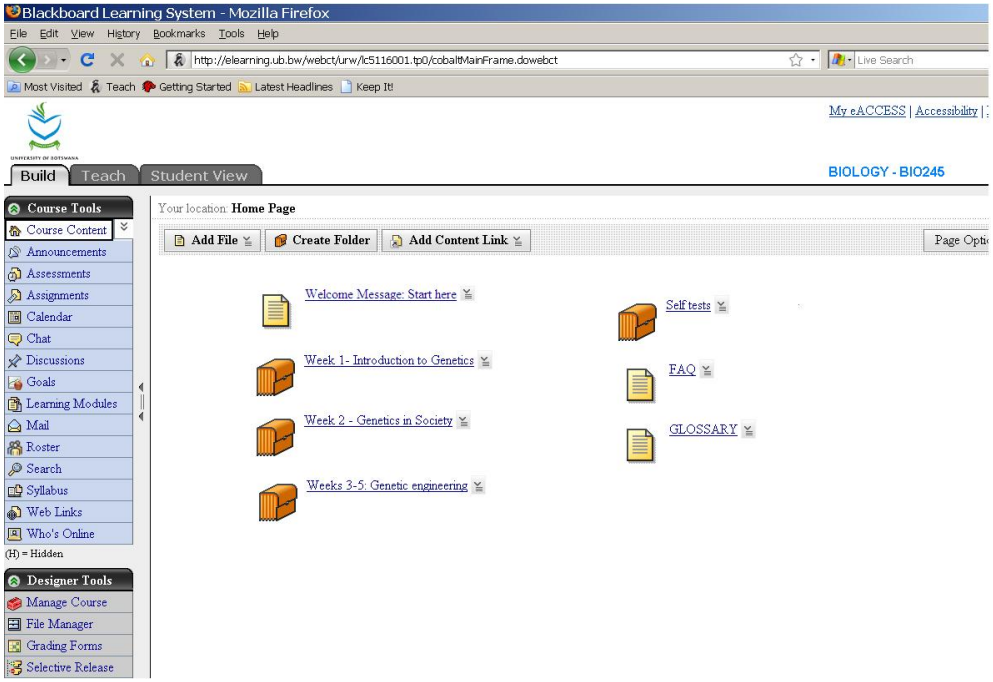

Figure 6.2: The course homepage (Pilot)

The social climate is critical for students to feel comfortable, to build trust among themselves and thus, to interact freely in a non-threatening environment. An overview of the course content follows the welcome message in the same file; this was the first document the students were expected to read in both the pilot and the final study, and so, it was clearly indicated as “Start here”.

From here, they were directed to a non-assessed discussion forum entitled, “self introduction / Icebreaker” and were encouraged to extensively utilise it to know each other. The discussion tool was accessible from the menu arranged vertically on the left.

Content of the welcome message is given below.

> *Hello students,*
>
> *You are welcome to the online component of your course BIO245. We are now in the 3rd week of this semester. In the coming three weeks, you will be studying about cloning which is an interesting topic that has taken media headlines in the recent past. Due to its novelty, I am sure we will find more useful information about it online than in any books.*
>
> *As I indicated in our face-to-face introduction to this module, we will be following a blended approach. My expectation is that you will have enhanced learning experience as we will be taking advantage of the strengths of both face-to-face and online instructional approaches. You can access this course anytime anywhere on campus as well as off campus; so enjoy the power of technology that makes learning flexible without any constraints of time and position.*
>
> *In this course, you will be working in groups most of the time; as a result you need to develop a spirit of community and a culture of working collaboratively. Therefore, there is need for you to know each other and I advise you to achieve this through the discussion forum, entitled, 'self introduction / Icebreaker'. Besides, you are also free to use the email tool to interact with others including me.*
>
> *After the self-introduction, please open the folder entitled, 'Weeks 3-5: Genetic engineering' for the course outline, learning objectives, assessment expectations/ guidelines and learning material. Also check the FAQ and Glossary files for answers to some of queries you might have on certain common issues, concerns and technical terms.*
>
> *Enjoy the blended approach!*
>
> *Regards*
>
> *Mark*
> *Your Course Tutor*

In addition, the homepage had two other files – FAQ and Glossary; the four folders contained more files. The folder titled 'Weeks 3 - 5: Genetic engineering' contained most of the tasks around this theme as shown below in Figure 6.3. Week 1 and Week 2 topics were not included in this study; these were included in the homepage as dummy to give the look of a full course and a sense of consistency and continuity. Another folder titled, "Self tests" contained links to several self tests. Each self test has been congruent with one or more objective(s). Self tests are meant to reinforce students' understanding and gauge themselves of their progress in the course.

When they open the folder titled, 'Weeks 3 - 5: Genetic engineering', they find six files numbered sequentially; the first file is "Course details" as shown in Figure 6.3. It

contains: course outline, learning objectives, assessment expectations/ guidelines, and links to advance organisers.

a) Learning materials on WebCT

The learning materials can be accessed by following the trail: Homepage → Folder entitled 'Weeks 3 – 5: Genetic engineering', when a window as shown in Fig 6.3 opens.

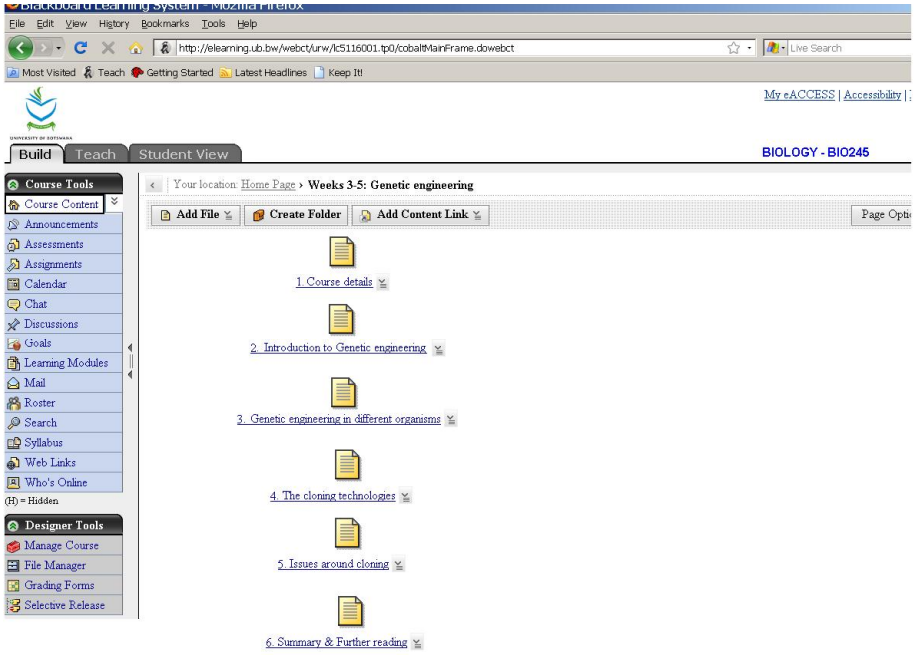

Figure 6.3: Learning materials

iii) The Course calendar

The course calendar (Fig. 6.4) can be accessed by following the trail: Homepage → Calendar tab (shown highlighted on the left menu below). It provided information on the dates for important course events. This is normally posted at the beginning of a course. If any change is made, it will be communicated to the students using the 'Announcements' tool. This tool has a provision for turning on a pop up feature in which case the announcement pops up next time the student logs in to WebCT, and catches his/her attention.

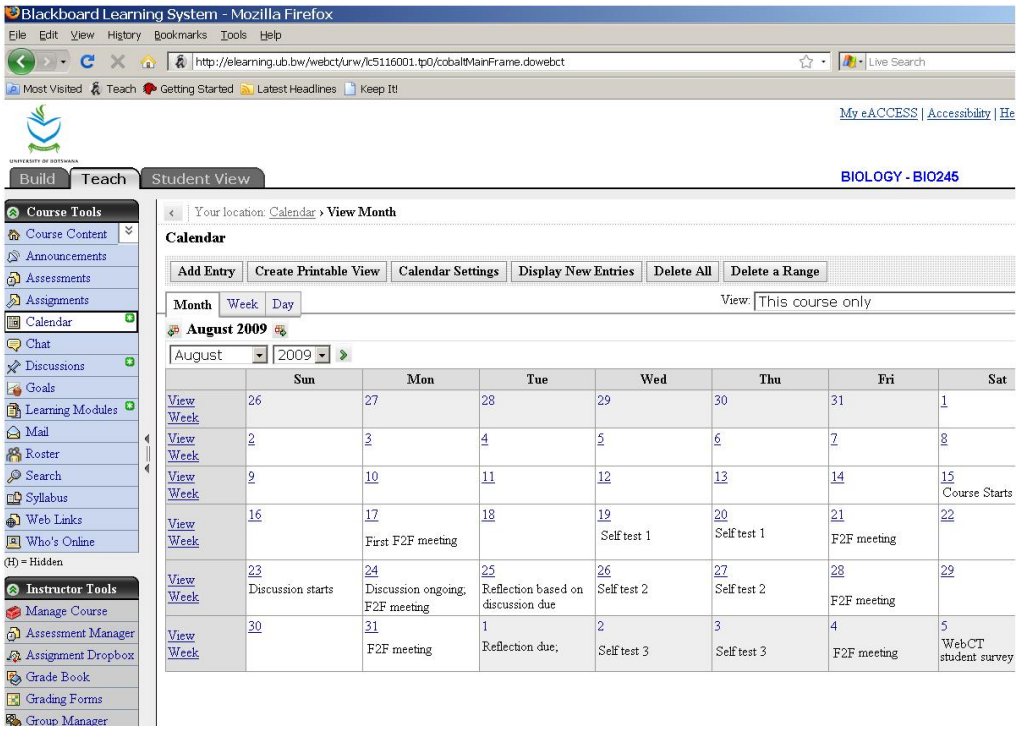

Figure 6.4: The course calendar

Activities such as self tests, discussion and reflection were hidden from the students until they were due for release as indicated in the course calendar; this was facilitated through the *selective release* tool at the bottom of the left menu under designer tools in Figure 6.3. The same self tests marked for two consecutive days on the calendar implies that a given test was available to students only on these two days after which it automatically disappeared from the student view.

The screenshot of an announcement made during the pilot is displayed below:

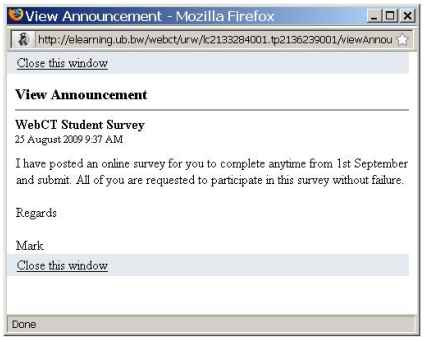

Figure 6.5 Announcement Pop up Screen

iv) Discussion forum

Discussion topics can be accessed by following the trail: Homepage → Discussion tab (shown highlighted on the left menu below). The screenshot of the discussion forum used for the pilot study is given in Figure 6.6.

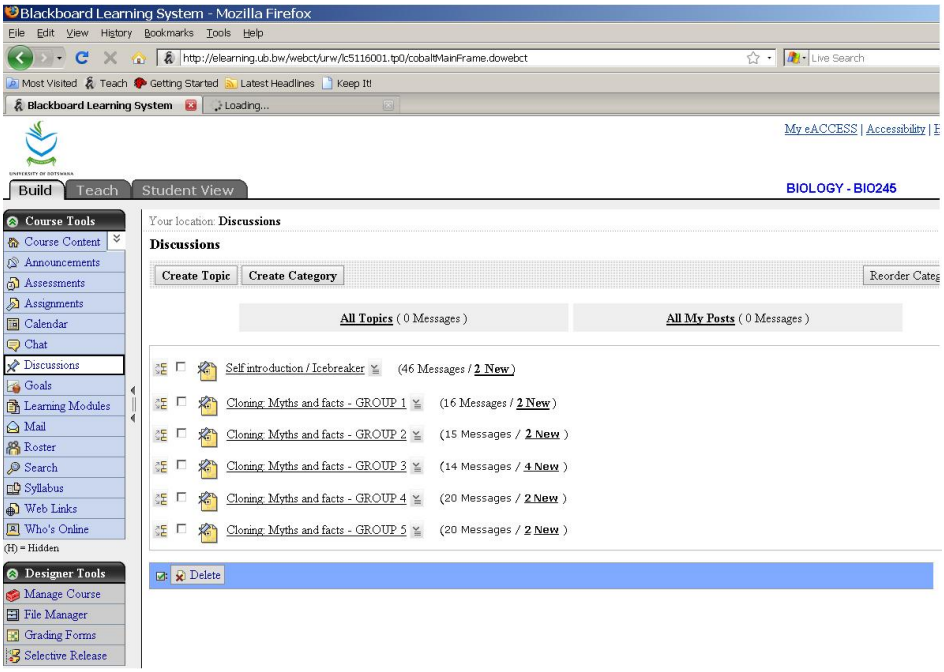

Figure 6.6 Discussion forum

The first one is the Icebreaker as indicated earlier. It was meant for students to introduce themselves to each other and to establish a social climate before the course started in full swing.

This tutorial has only one assessed discussion topic entitled, 'Cloning: myths and facts'; students will be discussing this theme in five different groups 1-5. The first three groups 1-3 have six students each and the last two Group 4 and Group 5 have seven students each. Students were required to work in groups as teamwork skills is one of the competencies of today's workplace.

The indication of the number of messages against each of the item in the screenshot indicates how many messages were read already by the tutor and how many yet to be read. For example, with the self introduction the tutor read 46 messages and 2 (shown in bold) more to read. These numbers are different for different users at a given time

except at the end when everyone has read all the messages.

After three days of discussion, each student was given access to see the comments in other discussion groups. And then they were required to send a reflection on their overall understanding of the myths and facts around cloning.

In a final study later, students had opportunity to engage in one discussion on asynchronous discussion forum and another one in a synchronous chat room.

v) Assessments and assignments

All test and assignment items were posted under these two tools. Assessment tool included self tests, quizzes, and surveys. In the pilot, three self tests and a student survey were given (Figure 6.7). The self tests and survey can be accessed by following the trail: Homepage → Assessments (shown highlighted on the left menu above).

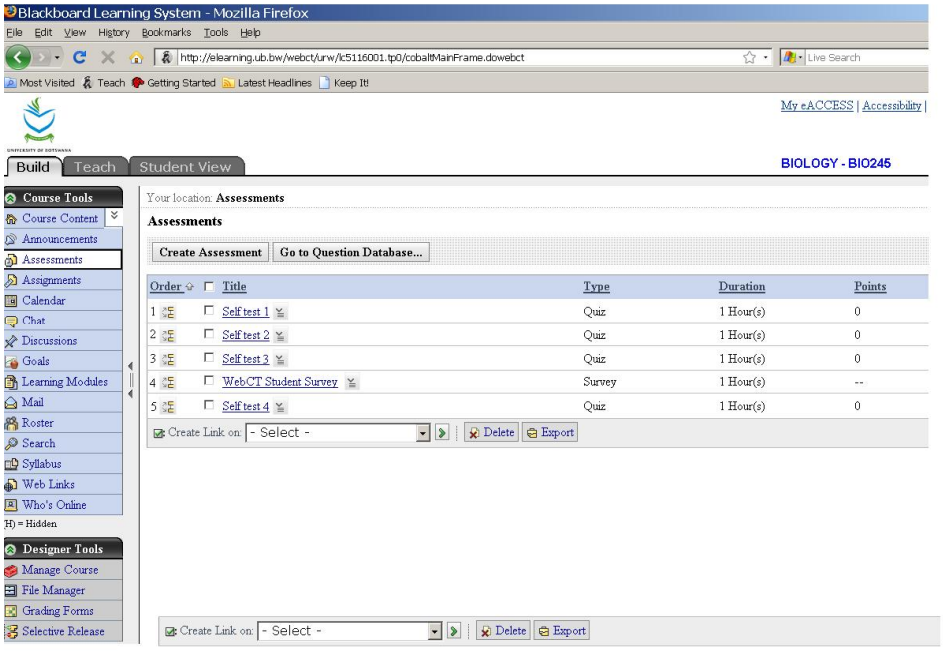

Figure 6.7 Assessments window

Self test was graded but not recorded; students got their score or grade and appropriate feedback as set by the tutor. Self test was meant for students to gauge

their individual progress as well as a learning tool in the course. The student survey was aimed at gauging student satisfaction of the blended approach.

Students were required to write two reflection assignments as it is evident from the screenshot in Figure 6.8— one on myths and facts around cloning, and the other around reproductive cloning and its ethical concerns. The 'Assignments' tool can be accessed by following the trail: Homepage → Assignments (shown highlighted on the left menu above).

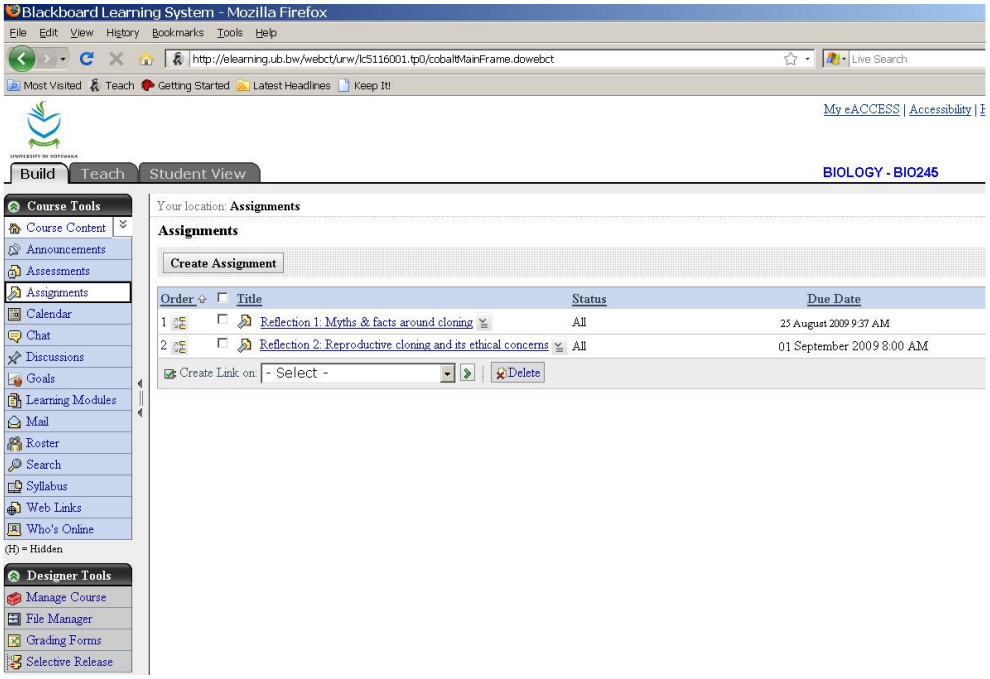

Figure 6.8: Two reflection activities as assignment

They all submitted the reflection assignments which were graded and became part of their continuous assessment (CA).

vi) 'Student view' of the WebCT learning environment

It is critical to test an online learning environment before students are given access to it in order to ensure that it functions properly and as expected. This can be done by clicking the *student view* tab which is shown highlighted in the screenshot in Figure 6.9 below.

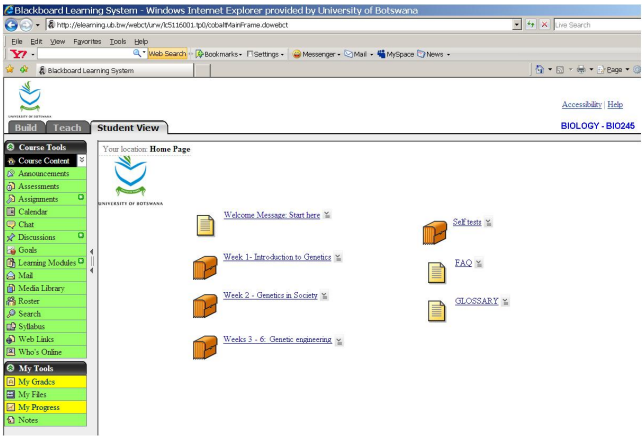

Figure 6.9: Student view tab

There is a tool called *'My Grades'* that allows students to view their grades for graded tests and assignments. *'My Progress'* is another tool that records the frequency of visits to the different pages of the site. These tools can be viewed only under the student view as shown highlighted in Figure 6.9.

In addition to the content, the site must also be checked for the availability of all course components to learning—tutor-learner feedback, opportunity for deep intellectual engagement, reflective learning, scaffolding, and authentic assessment—as discussed in Section 5.8.2.

6.3 Implementation phase

Section 6.2.2 discusses and demonstrates how the online part of the hybrid course based on the LAPTEL model was designed and developed at the pilot stage. In the implementation phase, the course was delivered to the students as indicated in the design plan. First the pilot and later, the full study was conducted; strategies for facilitating blended approach as discussed in Section 5.8.3 were religiously followed in the pilot and the final study; the difference in these two is that the final study was an improved version based on findings from the pilot study, but basically they were similar especially in terms of the screenshots.

A survey was carried out before the study began in order to analyse the learner profile and their ICT and WebCT skills. The instrument used for the survey is given in

Appendix A. The survey comprised items that related to subjects' demographics and their introductory ICT and WebCT skills.

The Researcher took the role of a participant as well as an auditor in the course, and monitored both online and face-to-face activities; the purpose was to observe learners' behaviour while engaging in processes that contributed towards active learning. Besides participant observation, he conducted individual and focus group interviews, and an online survey of student satisfaction within a broad framework of the evaluation instruments developed in Chapter 5 (Appendices B and C).

6.3.1 Pre-study preparations: Introductory survey and student orientation

(i) Participants in the two studies

Two classes of Biology students enrolled for BIO245 were identified for the pilot and the final evaluation of the LAPTEL model. It is a 2 credit course with two single one hour periods per week. Though they were doing this same course, they had enrolled for different majors, one for pure biology and the other for health education. These two classes were recorded as BIO245-B and BIO245-H for clarity.

These two classes were taught by the same tutor who was interested in the pedagogical use of technology. This interest was the basis for selecting this tutor and his classes. For convenience, it was decided to use the same topic for both classes; therefore, the tutor agreed to teach this topic in these two classes at different times within the first semester of the 2009/10 academic year. For the pilot, it was taught during the 3-5 weeks and for the final during the 10-12 weeks of the semester.

The subjects in the pilot were 32 (female: 18 and male: 14) second year BSc Biology students; they did BIO245-B. The other class used for the final study had 40 students (female: 26 and male: 14); they did BIO245-H. All these students were in the age range of 18 to 21.

(ii) Introductory survey results

Table 6.2: Introductory skills survey results (Pilot and final study)

Demography		Pilot	Final study
Gender	Female	18	26
	Male	14	14
Total		32	40
Age range in years	Whole class	18 to 21	18 to 21

Survey item	Responses	Responses rate	
		Pilot	Final study
Awareness of the purpose of the research and the participant's role	YES	100% (32)	100% (40)
	NO	None	None
Willingness to participate in the study	YES	100% (32)	100% (40)
	NO	None	None
Use of WebCT in at least one course in the same semester or in a previous semester	YES	100%	100%
	NO	None	None
Perception on the pedagogical benefits of WebCT	Positive	81.3% (26)	85% (34)
	Neutral	18.7% (6)	15% (6)
	Against the use of WebCT	None	None
Self-rating of WebCT skills	Better than average	12.5% (4)	10% (4)
	Average	75.0% (24)	80% (32)
	Satisfactory	12.5% (4)	10% (4)
	Poor	None	None
Self-rating of basic computer skills	Better than average	31.3% (10)	30% (12)
	Average	56.2% (18)	60% (24)
	Satisfactory	12.5% (4)	10% (4)
	Poor	None	None
Use of an Internet search engine (e.g., Google)	Better than average	37.5% (12)	10% (4)
	Average	53.1% (17)	80% (32)
	Satisfactory	9.4% (3)	10% (4)
	Poor	None	None
Use of email	Better than average	50.0% (16)	30% (12)
	Average	34.4% (11)	65% (26)
	Satisfactory	15.6% (5)	5% (2)
	Poor	None	None

Notable points from both studies taken together are:

- None of them reported of a lack of computer skills to such an extent that could be a disadvantage for them to participate in this study;
- The fact that all of them used WebCT in at least one course either in the same semester or in a previous semester was considered a key point in this study as it indicated that the medium was not new to any of the subjects. Further, none of them was against the use of WebCT for instruction, or was against participating in this study.

(iii) WebCT orientation to students

Though they all had some good exposure to the WebCT platform in their first year courses, a good orientation was considered critical as technology-supported collaborative learning requires certain essential skills that they need to acquire prior to engaging with the online learning activities; these skills include cognitive skills such as negotiation of meaning, reflective analysis and meta-cognition, and also low-level skills such as the basic use of computer mediated technology, online social skills, online etiquette, web navigation, and web searching skills. Failure to address these issues in online learning leads to much frustration for the learners, and eventually to lower levels of success for the online learning courses (Hara and Kling, 1999). It was also important to take them all to more or less the same level of the required skills. Both classes were given a two-hour orientation session in a WebCT 'smart' classroom where they were given training mainly on how to use WebCT. This orientation was done in collaboration with their own Course Tutor who is the major driver in this new pedagogic approach. Yet, it was led by the Researcher and was beneficial to the Course Tutor to improve his own skills in the use of WebCT.

At the beginning of the session, the purpose of the research was made clear, and their consent to participate in the study was sought. It was made clear that the participation was voluntary. Further, assurance was given that the data collected will not be used for any purpose other than this research. The Researcher also promised that the study outcome will be disseminated to any participant who may be interested in it.

Subsequently, they were given an introduction to the hybrid instructional approach and how the two modes of delivery will be integrated and facilitated for three weeks to teach the topic of 'cloning'. The tutor and the Researcher briefed them on the expectations of active participation, their contribution towards an online community development, netiquettes, the use of collaborative tools such as email, discussion boards, and chat rooms, participation in the use of these communication tools. The Course Tutor further made it clear how the extent of their participation would be evaluated (e.g., number and quality of posts in discussion, chat, etc. using *WebCT)* using the WebCT tracking tool and what tutor-response time on personal messages and grading assignments they should be expected.

After the introduction, the tutor engaged them in group and individual online activities. As an "ice breaker", a sample non-assessed online discussion was facilitated. Most students felt very enthusiastic about it and posted long messages. They were required to continue with the discussion as an online activity for the next two days. During online activities, the Course Tutor monitored how each student was getting used to the online environment, and supported those who needed help. He also used the track feature of WebCT and made students aware of this with examples of what he had found through tracking. Students generally tend not to skip online activities if they know that the teacher tracks them and really values their online presence and activities.

Later, a similar orientation was given to the participants of the final study just before the study began.

6.4 The Pilot study

The main purpose of piloting was to understand the usability and effectiveness of the theoretically developed LAPTEL model, what revision could be made to improve these expectations, and there up on to refine the evaluation instruments if there was a need.

The pilot study lasted for three weeks- precisely from 15th August to 5th September 2009 inclusive of the weekends in between because online learning is a 24x7 mode of

delivery. During this period, there were supposed to be a total of six normal face-to-face meetings, each lasting for 50 minutes on Mondays and Fridays. Also, there were 'virtual office' hours from 5 to 6 pm on Thursdays, during which the tutor was available online for students to interact with him in real time. By the end of the first week, that is, after meeting the students face-to-face twice in the first week, and once in a "virtual office" setting, the Course Tutor and the Researcher realised that the two face-to-face meetings in a week could be reduced to one because students started showing signs of being able to be on their own with the online component of the course. Two face-to-face sessions – the Monday lessons in the second and third weeks- were skipped; instead, students were advised to work online while the Course Tutor was monitoring and supporting them online. The Researcher also watched the online events simultaneously from his own office.

Further, in the pilot study ten students were selected for the semi-structured interview and another ten students for the online survey (while the entire class was used for these two surveys in the final study); also, the focus-group was not considered essential in the pilot although there were some informal group discussions to determine the 'overall feel' of the new instructional approach.

The expert evaluation was done by the Course Tutor himself and two of his colleagues from the Biology department. These colleagues were given all the evaluation instruments at the beginning of the course and were requested to visit both face-to-face sessions and the online space at their own convenient time.

The following sections bring together the survey and interview results of the pilot study, and discuss the application and validation of the research methodology.

6.4.1 Data collection from pilot study

(i) Semi-structured interviews

Being a pilot, only a sample group of the student population was taken for the semi-structured interview. The Researcher informed them early that participating in the survey was very voluntary and he wanted only ten students who came first to his office. The same approach was used for the online survey. He also informed them that

they can respond freely to express their opinion because the study was purely for the purpose of his research, and there was not any implication of any sort.

The tool in Appendix B formed the framework for the semi-structured interview planned in this study. First, they were asked to respond to the core items in the survey orally or in writing in the Researcher's presence; those who wanted to do it in writing were also allowed to take a hard copy of it, complete it and return it later; they all opted to complete it on paper; when they returned the completed survey, the Researcher scanned through the responses and subsequently, asked individual interviewee certain questions based on the responses especially where the response was "limited" or "No" in order to seek their views on how it can be improved. The overall response details are provided below:

Table 6.3: Frequency of student responses in the semi-structured interviews

	Stages		Responses		
1.	**Access**	N	Yes	Limited	No
(i)	I was able to log on to WebCT without any hassles.	10	5	4	1
(ii)	The online material was available and easily accessible anytime, anywhere I wanted.	10	7	2	1
(iii)	My access and technical support concerns (e.g., occasional log in problems) were addressed adequately and in a timely fashion.	10	9	0	1
(iv)	The learning material was also available offline (on CD or print-based)?	10	10	0	0
2.	**Participation**	N	Yes	Limited	No
(i)	Did an appealing social climate that motivated you to collaborate with peers and interact with the teacher at ease in an environment of trust and intellectual openness exist?	10	8	2	0
(ii)	The course was designed in such a way that I could feel confident with this new approach to learning and take responsibility for my own learning.	10	6	2	2
(iii)	The teacher promoted collaborative and cooperative learning on WebCT.	10	10	0	0

3.	**Tasks (course structure and content)**	N	Yes	Limited	No
(i)	The syllabus/course outline available.	10	10	0	0
(ii)	Were course expectations –goals, objectives and outcomes—clear?	10	10	0	0
(iii)	Was the content presented in small chunks in a flexible, sequential manner, yet it allowed you to make a picture of the whole easily?	10	10	0	0
(iv)	It made use of various learning facilitation media.	10	7	3	0
(v)	Was the course structure simple to understand and it allowed you to find information you wanted easily?	10	7	3	0
(vi)	It provided interesting, and intriguing cases and situations to improve my understanding.	10	8	2	0
(vii)	Was the course properly designed to take advantage of the unique applications for online delivery (eg., interaction with peers, the teacher and other experts)?	10	8	2	0
(viii)	Did the new content allow you to 'make a bridge' to your existing knowledge.	10	8	2	0
(ix)	Were the tasks relevant in real-life contexts and appropriate to your educational goals?	10	10	0	0
(x)	Were assignments and assessments clear, understandable and aligned with objectives?	10	10	0	0
(xi)	Were there self-tests useful to help you to understand the concepts better and monitor yourself your progress in the course?	10	10	0	0
(xii)	Were you provided with a module summary, glossary, and FAQs?	10	10	0	0
(xiii)	Did you have access to additional enriching learning resources - e.g., links to further reading, glossary, and FAQs?	10	10	0	0
(xiv)	Were there external links for further reading and did these links work correctly?	10	10	0	0
(xv)	Were the multiple modes of instruction (face-to-face, online-written, simulations, etc) beneficial in your understanding of concepts faster?	10	7	3	0
4.	**Engagement**	N	Yes	Limited	No
4.1	*Student- content interaction*				
(i)	The teacher used WebCT to create a comfortable learning space.	10	6	2	2
(ii)	Content was well structured to enable me to	10	7	2	1

	actively engage and manipulate it.				
(iii)	It provides learner communication and interaction opportunities (e.g. online discussion)	10	8	2	0
(iv)	Did technology-supported interactive opportunities give you greater opportunity for analysis and reflection of content than it is normally possible in face-to-face classrooms?	10	7	2	1
(v)	The content was interesting and it induced learning motivation.	10	7	3	0
4.2	*Student-teacher interaction*				
(i)	The teacher responded timely up on my queries and concerns about the course.	10	10	0	0
(ii)	There was sufficient feedback from the teacher to help me achieve my learning goals.	10	9	1	0
(iii)	The teacher personalized interactions with students whenever necessary and possible.	10	9	1	0
(iv)	The teacher provided 'virtual office' hours and I found it quite useful.	10	10	0	0
(v)	The teacher encouraged me to interact with other students and also with him.	10	10	0	0
4.3	*Peer-to-peer interaction*	N	Yes	Limited	No
(i)	Were there enough team-based activities that required collaboration with peers?	10	8	2	0
(ii)	Was the course structured in such a way that way you could discuss my assignments with other students before actually attempting them?	10	10	0	0
(iii)	Were your classmates glad in sharing ideas and helpful in your learning process?	10	6	2	2
(iv)	Did you have ample opportunity to explore the view points of peers, collaborate with them and learn from different perspectives?	10	7	2	1
4.4	*Student-interface interaction*	N	Yes	Limited	No
(i)	Was the 'look and feel' of the online pages consistent and appealing?	10	8	2	0
(ii)	Was the course information displayed on the screen simple, easily readable, logical and in an 'easy to find' manner?	10	8	2	0
(iii)	Was the interface easy to navigate knowing fully well where you came from and where you were heading to?	10	6	3	1
(iv)	Was technology easy to use?	10	5	2	3

5.	**Construction of knowledge (Learning)**		Yes	Limited	No
(i)	Did blended course activities contribute to your learning goals (vs. being a "waste of time")?	10	7	3	0
(ii)	Did your technology-supported interaction with the teacher, peers and content help you to learn for understanding?	10	7	2	1
(iii)	In your view, is trying to solve complex and ill-defined problems in collaborative and cooperative learning environments (social contexts) more beneficial than you trying it alone?	10	4	3	3
6.	**Assessments**	N	Yes	Limited	No
(i)	Were assignments, assessments and self tests aligned with stated course objectives?	10	7	3	0
(ii)	Were the assignments, assessments and self-tests useful to engage you in critical thinking rather than just means of rote memorization?	10	7	2	1
(iii)	Were they useful in articulating what you learned and in reflecting on the process for understanding?	10	6	2	2
(iv)	Did the assessment methods include strategies to recognise your individual contributions to group activities?	10	5	3	2
(v)	Were you able to continually monitor your own progress through frequent self tests?	10	5	3	2
(vi)	Did assignments, assessments and self tests provide opportunities for you to demonstrate or apply concepts and skills you have learned in alternatives ways?	10	4	3	3
(vii)	Did you have an opportunity for peer assessment, and to actively and critically reflect on your learning?	10	3	4	3
(viii)	Did rubrics and assessments accurately measure student achievement and learning?	10	3	5	2
(ix)	Were assessments timely and fair? Did you receive assessment feedback/grades in a timely fashion?	10	8	2	0
(x)	Did the teacher have performance monitoring strategies and intervention plans for student failure?	10	6	3	1
7.	**Overall**	N	Yes	Limited	No
(i)	I found the course environment very motivational.	10	8	2	0
(ii)	The course environment encouraged me to collaborate with my classmates.	10	6	4	0

(iii)	The course was well organized and presented.	10	8	2	0
(iv)	I could control the pace of my own learning.	10	9	1	0
(v)	Taking this course increased my interest in online learning.	10	6	3	1
(vi)	The instructor facilitated the course both online and face-to-face effectively.	10	7	3	0
(vii)	The affordances of WebCT were useful to create an efficient learning environment, and it could enhance the level of my understanding of course content.	10	7	2	1
(viii)	Throughout the course, the teacher has been enthusiastic about online teaching.	10	10	0	0
(ix)	Overall this course was valuable.	10	8	2	0

It is worth noting that the Mode (or the most frequent response) of the data for all items is a "YES".

Comments from students in the semi-structured interviews:

Important comments from students as response to the three oral questions are stated below.

To the first open question, "*All in all, does this new approach contribute towards your active learning?"* – 27 out of 32 participants responded with a "YES"; the remaining five responses were that they were "NOT SURE".

To the second question, "*What do you like most and least about this approach to instruction?"* – the responses were all in one or just a few words: 'flexibility'; "I could go over the material even after the classes, for example, from the library anytime"; 'technology is good'; 'technology brings change in the ways for learning'; 'opportunity for help from other students'; 'more encouragement and motivation from the tutor'; and 'more support from the tutor' for the most liked; and 'takes too much time'; 'technology is a bit daunting'; 'sometimes WebCT was down and found it unable to contact the teacher or peers'; and 'use of technology leads to plagiarism' for the least liked aspects of the new approach.

To the third question, "*Please make suggestions on how to improve this course*"—most participants did not have any response; a few who responded had the more or

less similar response: “we need our own laptops” and “computer is good, but we also need handouts”.

(ii) Student satisfaction survey

After the online survey was completed, a reversal of the negative items in their meaning and scores was done as discussed in Section 5.8.3.1 (ii) for analysis purpose. The items in positive format and the frequency of responses on each item are displayed in Tables 6.4.

Table 6.4: Frequency of responses (Pilot)

	Items	N	SA	A	U	D	SD
1	The course was well organized in such way that both modes of delivery contributed towards achieving my learning goals in a complementary manner.	10	6	3	1	0	0
2	Online information was easy to read and to find.	10	4	5	1	0	0
3	The online interface was easy to navigate.	10	5	4	1	0	0
4	Course expectations were quite clear.	10	5	4	1	0	0
5	The instructor communicated effectively.	10	4	5	1	0	0
6	Amount of material covered and course workload was about right.	10	3	4	1	2	0
7	Pace of the course was about right.	10	3	4	1	2	0
8	Self tests, assignments, and discussions contributed to understanding the material.	10	5	3	1	1	0
9	Timely and adequate feedback was provided on assignments.	10	5	3	2	0	0
10	The instructor facilitated the both face-to-face and online teaching and learning effectively.	10	4	5	1	0	0
11	The instructor was accessible to me online anytime I have had a problem.	10	4	3	2	1	0
12	The instructor was tolerant of others' ideas and views.	10	4	6	0	0	0

13	The instructor personalized interactions with me whenever necessary.	10	4	5	1	0	0
14	The instructor adapted to students' instructional needs.	10	3	5	1	1	0
15	The instructor provided several ways for students to demonstrate understanding of important course concepts.	10	1	7	1	1	0
16	The instructor encouraged students to interact with one another.	10	6	4	0	0	0
17	The instructor used WebCT to facilitate thoughtful discussions.	10	4	6	0	0	0
18	The blended approach provided a more efficient collaborative learning environment than it would have been possible in face to face or WebCT alone.	10	4	5	1	0	0
19	This course improved my understanding of the content.	10	3	5	1	1	0
20	The blended approach increased my interest in the course.	10	5	4	1	0	0
21	The course was designed to allow me to take responsibility for my own learning.	10	3	6	1	0	0
22	The instructor motivated me to ensure my attention to the learning materials and assignments.	10	7	3	0	0	0
23	The blended approach used in this course was valuable.	10	5	4	1	0	0
24	The instructor did a good job.	10	5	4	1	0	0
25	Technical support was satisfactory.	10	5	4	1	0	0

Whether individual Likert data can be considered as ordinal or interval is a subject of disagreement. Many researchers regard such items only as ordinal data, because, especially when using only five levels, one cannot assume that respondents perceive all pairs of adjacent levels as equidistant (Wikipedia, n.d.). In this study, the data are considered ordinal as the scores 1-5 only tell us that the students with higher-numbered responses are more in agreement with the item statement than those with the lower-numbered responses.

Although it is tempting to use the Mean to determine the central tendency for Likert scale data, a more appropriate measure to use is the Mode (or the most frequent

response). However, this study uses *Mean, Mode and standard deviation* to interpret data. The Mean, Standard deviation and the Mode for each item and the total mean for each student were computed. The consolidated data and computed values are provided in Appendix E.

Each item was then analyzed separately: the Mean, Standard deviation and Mode of responses for each item and each student were determined and tabulated (Appendix E). Relevant computed values were then totalled to create a total mean score for each item and each student.

The Means for individual items ranged from 3.80 to 4.70, and the Mean of all the items together was 4.00. There are eleven 5's (strongly agree), fourteen 4's (Agree) and none in the range of 3 to 1 for the Mode values of each item. The overall item-based Mode can be said to be 4. Therefore, based on the values of the Mean, and the Mode, the overall item-based comment can be said to be in the range of Agree to Strongly Agree, and is a significantly notable outcome of the study.

The Means for individual students ranged from 3.96 to 4.56, and the Mean of all the students together was 4.26; this is an indication of the average student satisfaction level which may be considered to be in the range of Agree to Strongly Agree.

(iii) Comments from the Course Tutor and Expert Evaluators

After the pilot, the Course Tutor and the two Expert Evaluators completed the expert evaluation survey with a "YES" response to all the items, meaning that the pilot achieved its aim successfully and the model was passed by them for the final study. However, the Course Tutor endorsed the framework for the semi-structured interviews with some reservations on its length. A similar view was earlier expressed by the four lecturer arbitrators who reviewed the instrument. It was considering these views the survey instrument was initially modified for use in the pilot by reducing the number of items from 78 to 62. As none of these four arbitrators or the two Expert Evaluators was strongly against its length, the Researcher preferred to keep it for the following reasons:

a) The Researcher felt that the longer it was, the better it was in a study like this in order to take care of all possible aspects;

b) The Researcher did not have much difficulty in administering it in the pilot;

c) The tool was basically meant for semi-structured interview and as such it could be made flexible by asking only selected questions indicative of each section.

6.4.2. Test-Retest Reliability test of the student satisfaction survey instrument

Computing test-retest reliability simply involves computing a correlation coefficient. Pearson[2] correlation coefficient was calculated using SPSS Version 17.

The ten students participated in the evaluation exercises were coded as P.1 … P.10 for the purpose of matching their scores in the test and retest. As discussed in Section 5.8.3.1, the total mean scores of each of the ten students in the test and re-test were calculated (Appendices E and F).

The mean values are displayed in Table 6.5 below. The maximum possible score was 5 and the minimum 0 if they had responded to all the items. They responded to all the items. The means ranged from 3.96 to 4.56 in the test and from 3.68 to 4.52 in the retest.

Table 6.5: Means on Test and Retest

Student ID	Mean score on Test	Mean score on Retest
P.1	4.12	4.20
P.2	4.28	4.20
P.3	4.56	4.48
P.4	4.36	4.52
P.5	3.96	3.68
P.6	4.24	4.04
P.7	4.20	4.04
P.8	4.16	4.24
P.9	4.36	4.20
P.10	4.40	4.32

[2] *The Pearson correlation coefficient is a way of determining the extent to which two sets of data are associated or correlated, with each other. It can be either as descriptive or inferential. As a descriptive statistic, it demonstrates the size and the direction of the statistical relationship. As an inferential statistic, it can be used to test hypotheses about relationships between data sets within and between populations.*

The two sets of mean scores for all the ten students were entered in the SPSS variables window. Upon choosing "Correlate, Bivariate" from the Analyze menu, the result was displayed in the output view as given below in Table 6.6. The analysis results indicated a high measurement reliability of 0.822.

Table 6.6: SPSS Output of Pearson correlation

		Mean Test	Mean Retest
Mean_Test	Pearson Correlation	1	.822**
	Sig. (2-tailed)		.003
	N	10	10
Mean_Retest	Pearson Correlation	.822**	1
	Sig. (2-tailed)	.003	
	N	10	10

**. Correlation is significant at the 0.01 level (2-tailed).

A graphical representation of the two sets of Means is given below. Looking at the trends of both means distribution, a similar trend can be seen and it represents a high correlation between them as indicated in the SPSS output.

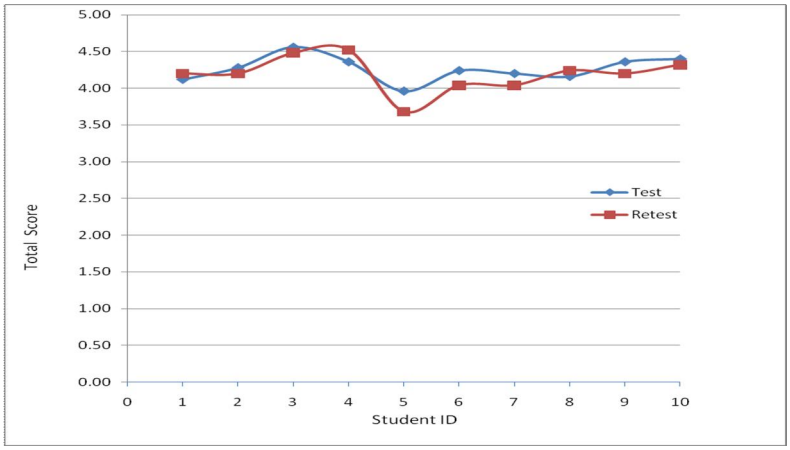

Figure 6.10: Graphical representation of Test-Retest Means

6.5 The final evaluation of the LAPTELmodel

Following the successful outcome of the pilot study, the next level of evaluation study— the final one— was conducted in the same manner as the pilot was done. The same course and the same tutor were used with a different cohort of students. This time there were 40 students in this class, 26 female and 14 male students.

The class was BIO245-H with two single periods per week. The H in the course code represents that it is a group of students different from the pilot group (BIO245-B). This study also lasted for three weeks- precisely from 3rd to 25th October 2009 inclusive of the weekends. During this period, there were six face-to-face meetings, each lasting for 50 minutes on Tuesdays and Thursdays. However, as it was done in the pilot, only one face-to-face meeting was conducted in the 2nd and 3rd weeks; however, students were required to work online during the two second periods of the second and third weeks while the online activities were being monitored by the Course Tutor and the Researcher. There were 'virtual office' hours from 5 to 6 pm on Mondays and Fridays; during these periods the tutor was available online for students to interact with him in real time. In all there were virtual office opportunities on five days (two Mondays and three Fridays). The Researcher monitored online activities while the virtual office hours were in progress.

Before the study, the subjects were given a two-hour face-to-face orientation exactly as it was done before the pilot as discussed in Section 6.3. This was done outside normal class hours. At the beginning of the orientation session, the introductory skills survey was administered, and the outcome is displayed in Table 6.2.

Students were clearly made to understand the purpose of the study, how long it would take, the research conditions and requirements— participation was voluntary; it was part of a research; they were assured that its outcome will only be used for the purpose of this research. All students were given an orientation on the use of WebCT jointly by the Researcher and the Course Tutor; this orientation covered topics such as how to use log on to WebCT (with the assigned usernames and passwords), how to change a password, the navigation structures, the various tools and how to use them, and how to participate in online activities including the netiquettes.

Subsequently, students were given an introduction to the hybrid instructional approach and how the two modes of delivery would be facilitated for the three weeks to teach the topic of cloning under genetic engineering. There were also given individual and group activities in order become familiar with the tools and fellow students. For discussions they were divided into five groups as in the pilot, each with eight students. The only difference was that, number of self tests was increased from three to four; the reason is that students in the pilot opined highly about the self tests as they were programmed to give immediate feedback. These self tests are displayed in Appendix J. In this study also, the Researcher took the role of a participant as well as an auditor in the course; the purpose was to observe learners' behaviour while engaged in blended learning.

The course was delivered in the same manner as the pilot, and thus had similar online and face-to-face scenarios. In addition, subjects in the final study were given a 'reflective journal' assignment entitled, "Personal views on human cloning' to develop individually as their understanding of cloning builds up. Relevant distinct screen shots are displayed in Appendix I.

6.5.1 Data collection and analysis

Being a case study (which seeks a range of *different evidence* from the case settings), several sources of data were collected and collated to ensure trustworthiness in the study. Focus group interviews and member checking- were conducted with students using the evaluation instrument formulated in Chapter 5, Section 5.8.3.1 (see Appendices C and D for the instruments). Participants' responses were recorded and transcribed to text. Other methods used were: Participant observation (with field notes), member checking, and triangulation. Member checking is used to compare the accuracy of the data (Creswell, 2003).

The course satisfaction survey tool was posted online for them to complete at their own time during the last two days of the course. The Course Tutor reiterated the importance of this survey and urged them to complete it. By the second day they all, completed.

The Researcher studied the responses in the semi-structured interviews, and later conducted a focus group interview with a representative sample of ten subjects in the week after the end of the course.

The outcomes of the focus group interviews were triangulated with the responses from semi-structured interviews, online student survey, and reports of four Expert Evaluators.

6.5.1.1 Semi-structured interviews

The semi-structured interview along with the online student survey responses gave very useful information on the usefulness and effectiveness of the LAPTEL model.

Responses were quantified by assigning numerical values to the three opinions: 'Yes', 'Limited' and 'No' as 2, 1 and zero respectively.

Table 6.7: Frequency of student responses in the semi-structured interviews (Final study)

1	**Access**	N	Yes (2)	Limited (1)	No (0)	Mean	Mode
(i)	I was able to log on to WebCT without any hassles.	40	34	4	2	1.80	2
(ii)	The online material was available and easily accessible anytime, anywhere I wanted.	40	36	2	2	1.85	2
(iii)	My access and technical support concerns (e.g., occasional log in problems) were addressed adequately and in a timely fashion.	40	36	4	0	1.90	2
(iv)	The learning material was also available offline (on CD or print-based)?	40	40	0	0	2.00	2
	Total (for the domain *Access*)	40				1.89	2
2	***Participation***						
(i)	Did an appealing social climate that motivated you to collaborate with peers and interact with the teacher at ease in an environment of trust and intellectual	40	32	8	0	1.80	2

	openness exist?						
(ii)	The course was designed in such a way that I could feel confident with this new approach to learning and take responsibility for my own learning.	40	33	6	1	1.80	2
(iii)	The teacher promoted collaborative and cooperative learning on WebCT.	40	32	8	0	1.80	2
	Total (for the domain *Participation*)	40				1.80	2
3	***Tasks (course structure and content)***						
(i)	The syllabus/course outline available.	40	40	0	0	2.00	2
(ii)	Were course expectations – goals, objectives and outcomes—clear?	40	38	2	0	1.95	2
(iii)	Was the content presented in small chunks in a flexible, sequential manner, yet it allowed you to make a picture of the whole easily?	40	40	0	0	2.00	2
(iv)	It made use of various learning facilitation media.	40	22	18	0	1.55	2
(v)	Was the course structure simple to understand and it allowed you to find information you wanted easily?	40	29	9	2	1.68	2
(vi)	It provided interesting, and intriguing cases and situations to improve my understanding.	40	22	18	0	1.55	2
(vii)	Was the course properly designed to take advantage of the unique applications for online delivery (eg., interaction with peers, the teacher and other experts)?	40	30	10	0	1.75	2
(viii)	Did the new content allow you to 'make a bridge' to your existing knowledge.	40	28	12	0	1.70	2
(ix)	Were the tasks relevant in real-life contexts and appropriate to your educational goals?	40	36	4	0	1.90	2

(x)	Were assignments and assessments clear, understandable and aligned with objectives?	40	37	3	0	1.93	2
(xi)	Were there self-tests useful to help you to understand the concepts better and monitor yourself your progress in the course?	40	38	2	*0*	1.95	2
(xii)	Were you provided with a module summary, glossary, and FAQs?	40	40	0	*0*	2.00	2
(xiii)	Did you have access to additional enriching learning resources such as links to further reading?	40	40	0	*0*	2.00	2
(xiv)	Were there external links for further reading and did these links work correctly?	40	40	0	*0*	2.00	2
(xv)	Were the multiple modes of instruction (face-to-face, online-written, simulations, etc) beneficial in your understanding of concepts faster?	40	36	4	*0*	1.90	2
	Total (for the domain *Tasks*)	40				1.86	2
4	***Engagement***						
4.1	*Student- content interaction*						
(i)	The teacher used WebCT to create a comfortable learning space.	40	28	12	0	1.70	2
(ii)	Content was well structured to enable me to actively engage and manipulate it.	40	27	13	0	1.68	2
(iii)	It provides learner communication and interaction opportunities (e.g. online discussion)	40	40	0	0	2.00	2
(iv)	Did technology-supported interactive opportunities give you greater opportunity for analysis and reflection of content than it is normally possible in face-to-face classrooms?	40	38	2	0	1.95	2
(v)	The content was interesting and it induced learning motivation.	40	35	5	0	1.88	2
	Total (for student- content interaction)	40				1.84	2

4.2	*Student-teacher interaction*						
(i)	The teacher responded timely up on my queries and concerns about the course.	40	35	5	0	1.88	2
(ii)	There was sufficient feedback from the teacher to help me achieve my learning goals.	40	37	3	0	1.93	2
(iii)	The teacher personalized interactions with students whenever necessary and possible.	40	40	0	0	2.00	2
(iv)	The teacher provided 'virtual office' hours and I found it quite useful.	40	40	0	0	2.00	2
(v)	The teacher encouraged me to interact with other students and also with him.	40	40	0	0	2.00	2
	Total (for student-teacher interaction)	40				1.96	2
4.3	*Peer-to-peer interaction*						
(i)	Were there enough team-based activities that required collaboration with peers?	40	40	0	0	2.00	2
(ii)	Was the course structured in such a way that way you could discuss my assignments with other students before actually attempting them?	40	38	2	0	1.95	2
(iii)	Were your classmates glad in sharing ideas and helpful in your learning process?	40	30	10	0	1.75	2
(iv)	Did you have ample opportunity to explore the view points of peers, collaborate with them and learn from different perspectives?	40	32	8	0	1.80	2
	Total (for peer-to-peer interaction)	40				1.88	2
4.4	*Student-interface interaction*						
(i)	Was the 'look and feel' of the online pages consistent and appealing?	40	32	8	0	1.80	2
(ii)	Was the course information displayed on the screen simple, easily readable, logical and in an 'easy to find' manner?	40	36	4	0	1.90	2

(iii)	Was the interface easy to navigate knowing fully well where you came from and where you were heading to?	40	40	0	0	2.00	2
(iv)	Was the online environment was user friendly in general?	40	25	10	5	1.50	2
	Total (for student-interface interaction)	40				1.84	2
	Total (for the domain *Engagement*)	40				1.88	2
5	***Construction of knowledge (Learning)***						
(i)	Did blended course activities contribute to your learning goals (vs. being a "waste of time")?	40	36	4	0	1.90	2
(ii)	Did your technology-supported interaction with the teacher, peers and content help you to learn for understanding?	40	37	3	0	1.93	2
(iii)	In your view, is trying to solve complex and ill-defined problems in collaborative and cooperative learning environments (social contexts) more beneficial than you trying it alone?	40	30	8	2	1.70	2
	Total (for the domain *Learning*)	40				1.84	2
6	***Assessments***						
(i)	Were assignments, assessments and self tests aligned with stated course objectives?	40	38	2	0	1.95	2
(ii)	Were the assignments, assessments and self-tests useful to engage you in critical thinking rather than just means of rote memorization?	40	37	3	0	1.93	2
(iii)	Were they useful in articulating what you learned and reflecting on the process for understanding?	40	38	2	0	1.95	2
(iv)	Did the assessment methods include strategies to recognise your individual contributions to group activities?	40	35	5	0	1.88	2
(v)	Were you able to continually monitor your own progress through frequent self tests?	40	38	2	0	1.95	2

(vi)	Did assignments, assessments and self tests provide opportunities for you to demonstrate or apply concepts and skills you have learned in alternatives ways?	40	32	6	2	1.75	2
(vii)	Did you have an opportunity for peer assessment, and to actively and critically reflect on your learning?	40	24	12	4	1.50	2
(viii)	Did rubrics and assessments accurately measure student achievement and learning?	40	23	15	2	1.53	2
(ix)	Were assessments timely and fair? Did you receive assessment feedback/grades in a timely fashion?	40	40	0	0	2.00	2
(x)	Did the teacher have performance monitoring strategies and intervention plans for student failure?	40	37	3	0	1.93	2
	Total (for the domain *Assessment*)	40				1.84	
7	***Overall Comments***						
(i)	I found the course environment very motivational.	40	32	8	0	1.80	2
(ii)	The course environment encouraged me to collaborate with my classmates.	40	33	7	0	1.83	2
(iii)	The course was well organized and presented.	40	38	2	0	1.95	2
(iv)	I could control the pace of my own learning.	40	36	4	0	1.90	2
(v)	Taking this course increased my interest in online learning.	40	39	1	0	1.98	2
(vi)	The instructor facilitated the course both online and face-to-face effectively.	40	40	0	0	2.00	2
(vii)	The affordances of WebCT were useful to create an efficient learning environment, and it could enhance the level of my understanding of course content.	40	33	7	0	1.83	2
(viii)	Throughout the course, the teacher has been enthusiastic about online teaching.	40	40	0	0	2.00	2
(ix)	Overall this course was	40	39	1	0	1.98	2

	valuable.						
	Total (for the domain *Overall comments*)	40				1.92	2
	GRAND TOTAL (LAPTEL)	**40**				**1.87**	**2**

As in the pilot study, in the final survey-part of the semi-structured interview, the Mode of the data (or the most frequent response) for all items is a "YES" response.

Comments from students in the semi-structured interviews:

The following comments included students' response to the three oral questions and other related questions in the semi-structured interviews. Several comments recur in both studies.

To the first open question, "*All in all, does this new approach contribute towards your active learning?"* 35 out of 40 participants responded with a "YES"; the remaining five responses indicated that they were not sure. Although it is tempting to draw an immediate inference could be that the blended approach does not suit everyone, the Researcher preferred not to do it. Instead, he then tracked the online engagement of these five students and found they generally spent less time online; however, they submitted reflection assignment.

To the second question, "*What do you like most and least about this approach to instruction?"* all the responses were all in a few words or a short statement:

The most liked aspects included:

- '*very comprehensive and really enjoyable';*
- *'easily catch up if you have missed a lesson';*
- '*could go over the material even after the classes from home';*
- '*good to use when I haven't fully understood everything in class';*
- "*The simulation demo on cloning was interesting, thus students can actually see what is usually talked about";*
- *'This class let me learn at my own pace';*
- '*It helped me to manage my time better';*

- *'Simulation really worked; it showed how cloning worked in reality; to me, seeing is believing';*
- *'It is easier to understand than reading a book or listening to a lecture';*
- *'it does not take long to understand concepts';*
- *'the blended approach is more effective and personalised because any doubt on difficult concepts can be clarified either through online interactions or face-to-face interactions';*
- *'Found this approach quite challenging; it motivates one to seek information and solutions';*
- *'The tutor encouraged the sharing of ideas among the group; it really worked; helped in building up better relationship between people";*
- *'Easy to evaluate one's progress in the study through the use of self tests';*
- *'If I didn't understand any words or technical terms, immediately I could check an online dictionary or the built in glossary, no need to guess; I love it';*
- *'With this approach, there is no so much unnecessary classroom talk that are not sometimes well focussed';*
- *'I noticed the two modes are not repeating the same thing, one drives the other; both modes are essential to get everything; without participating in the online side, I won't have got some points; this is different from other courses where lectures teach in the classroom and post the hand outs online on WebCT';*
- *'The course space is visually appealing, well organized, and comprehensive';*
- *'This approach looks like a team effort in teaching, so it is more effective'.*

And the least-liked aspects included:

- *'takes too much time';*
- *'it took a lot of time for this subject alone, if all course go online we might run into problems';*
- *'technology is quite daunting';*

- *'WebCT was not sometimes available especially weekends when we could afford more time to spend';*
- *'sometimes there is no cooperative spirits among group members';*
- *'technology leads to plagiarism'.*

To the third item, "*Please make suggestions on how to improve this course*", most of the comments were around the need for internet access in their hostel rooms, provision of laptops from the University, and strict measures to curb the possibilities for plagiarism because according to them some students do a 'copy and paste' of online materials and submit as their work against which no action is taken by tutors.

6.5.1.2 Student satisfaction survey

The frequencies of responses obtained for each item in the questionnaire are displayed below in Table 6.8.

Table 6.8: Frequency of responses in the online student satisfaction survey (Final study)

	Items	**N**	SA	A	U	D	SD
1	The course was well organized in such way that both modes of delivery contributed towards achieving my learning goals in a complementary manner.	40	22	14	2	2	0
2	Online information was easy to read and to find.	40	15	18	2	3	2
3	The online interface was easy to navigate.	40	23	14	3	0	0
4	Course expectations were quite clear.	40	18	12	5	5	0
5	The instructor communicated effectively.	40	17	21	2	0	0
6	Amount of material covered and course workload was right.	40	12	18	5	5	0
7	Pace of the course was right.	40	11	19	6	4	0
8	Self tests, assignments, and discussions contributed to understanding the material.	40	18	19	2	1	0
9	Timely and adequate feedback was provided on assignments.	40	22	14	3	1	0

10	The instructor facilitated the both face-to-face and online teaching and learning effectively.	40	22	18	0	0	0
11	The instructor was accessible to me online anytime I have had a problem.	40	16	20	3	1	0
12	The instructor was tolerant of others ideas and views.	40	15	24	1	0	0
13	The instructor personalized interactions with me whenever necessary.	40	20	18	2	0	0
14	The instructor adapted to students' instructional needs.	40	12	23	2	3	0
15	The instructor provided several ways for students to demonstrate understanding of important course concepts.	40	6	26	3	5	0
16	The instructor encouraged students to interact with one another.	40	23	17	0	0	0
17	The instructor used WebCT to facilitate thoughtful discussions.	40	22	18	0	0	0
18	The blended approach provided a more efficient collaborative learning environment than it would have been possible in face to face or WebCT alone.	40	30	10	0	0	0
19	This course improved my understanding of the content.	40	12	20	5	3	0
20	The blended approach increased my interest in the course.	40	20	19	1	0	0
21	The course was designed to allow me to take responsibility for my own learning.	40	12	26	2	0	0
22	The instructor motivated me to ensure my attention to the learning materials and assignments.	40	27	13	0	0	0
23	The blended approach used in this course was valuable.	40	22	15	3	0	0
24	The instructor did a good job.	40	21	17	2	0	0
25	Technical support was satisfactory.	40	20	18	2	0	0
Total (Student satisfaction)		**40**	**18.32**	**18.04**	**2.24**	**1.32**	**0.08**

SA=Strongly Agree (5); A=Agree (4); N=Undecided (3); D=Disagree (2); SD=Strongly Disagree (1)

The Mean, Standard Deviation and the Mode for each item and the total mean for each student were computed. These values are displayed in Appendix G. Some of the pertinent responses from the online student satisfaction survey are:

- The course was well organized in such way that both modes of delivery contributed towards achieving my learning goals in a complementary manner (Item No. 1: Mean=4.40, σ=0.81 and Mode=5 or Strongly Agree);
- The blended approach provided a more efficient collaborative learning environment than it would have been possible in face-to-face or WebCT alone (Item No. 18: Mean=4.75, σ=0.44 and Mode=4 or Agree);
- The course improved their understanding of the content (Item No. 19: M=4.03, σ= 0.89 and Mode=4 Agree);
- The course increased their interest in the course (Item No. 20: M=4.48, σ= 0.55 and Mode=5 or Strongly Agree);
- The course allowed them to take responsibility for their own learning (Item No. 21: M=4.25, σ= 0.54 and Mode=4 or Agree);
- The blended approach used in this course was valuable (Item No. 23: M=4.48, σ= 0.64 and Mode=5 or Strongly Agree);
- They got personalized interactions from the tutor whenever necessary (Item No. 13: M=4.45, σ= 0.60 and Mode=5 or Strongly Agree);
- The instructor adapted to their instructional needs. (Item No. 14: M=4.10, σ= 0.81 and Mode=4 or Agree).

The findings displayed in Appendix G indicate that the means for each item ranged between 3.83 and 4.75, and the mean for the entire survey 4.33. This is illustrated graphically below in Figure 6.11.

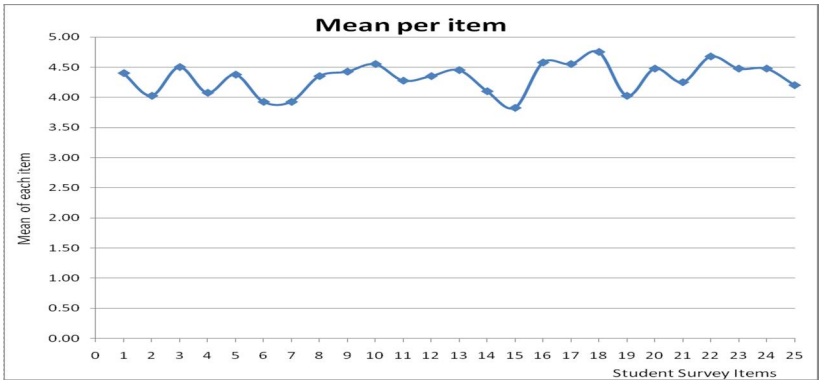

Figure 6.11: Mean score on each item in the final online student survey

The graph indicates that the overall student satisfaction on each item ranged from Agree to Strongly Agree, and is a significant finding of the study. This is further supported with the values for the Mode (5). There are thirteen 5's (strongly agree), twelve 4's (Agree) and none in the range of 3 to 1 for the mode values.

Further the overall Mean, its Standard Deviation and Mode were computed for each student as illustrated in Appendix G. The student mean ranged from 4.12 to 4.62 and the overall student mode is 5. This values also indicated that the student satisfaction was in the range of agree to strongly agree.

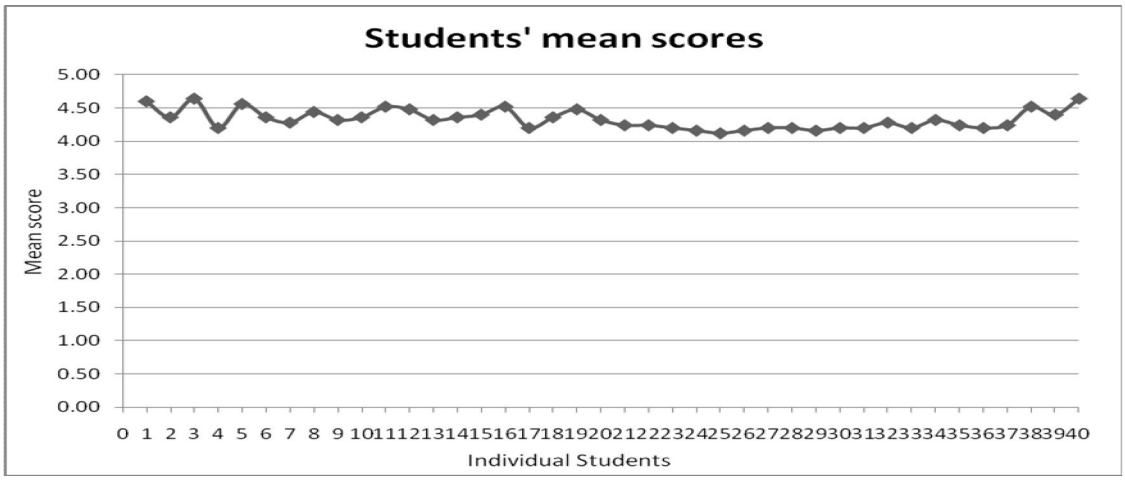

Figure 6.12: Mean score of each student in the final online student survey

6.5.1.3 Expert evaluation

Given below is a summary of the review report from the four experts who visited at least one face-to-face session and accessed the online part several times during the course period.

Table 6.9: Frequency of responses by Expert Evaluators

	Items	Response	
		YES	NO
1)	Does the course provide adequate opportunities for:	4	0
	Social presence:	4	0
	Authentic learning:	4	0
	Enhanced motivation:	4	0

	Collaborative construction of knowledge:	4	0
	Learner-centredness:	4	0
	Students' different learning needs:	4	0
	Interaction among students and with the instructor:	4	0
	Timely feedback:	4	0
	Authentic assessment (with possibilities of automatic grading/ scoring):	4	0
	Self tests and assignments that contribute towards effective learning:	4	0
	Authentic assessment (with possibilities of automatic grading/ scoring):	4	0
	Metacognistion and reflection:	4	0
	Cognitive conflict and complexity	4	0
	Learner control:	4	0
	Customisation:	4	0
	Variation:	4	0
	Additional resources (enriching as well as remedial):	4	0
	Course evaluation and student feedback:	4	0
2)	Is the online part easily accessible, and usable?	4	0
3)	Is the student interface visually appealing and easy to navigate?	4	0
4)	All in all, did this new approach contribute towards active learning?	4	0

All the four lecturers evaluated the study with a "YES" response to all the objective type items, and included their comments against the items as well as to the three open-ended questions. The comments to individual items indicated that they were positive in WebCT's potential in enhancing students' social as well as personalised learning experiences if it was used appropriately. All of them emphasised the word *appropriate* as they are aware that most teachers who currently make use of WebCT at UB do not use it for pedagogical advantages rather they use it only to make their traditional practice easy (new technology with old pedagogy, as commented by one of them); one approach they are all fond of is to post the course outline and notes online just to replace the print-based materials that are used in traditional approaches.

They evaluated the content covered and discourse at different levels, particularly the nature, quantity and quality of interactions by looking at the discussion 'threads' and email messages in order to understand how shared understanding developed in both face-to-face and online learning environments. The nature and pattern of interactions gave indications of the much required social presence, how this presence changed over time, and how it supported and sustained the community in their learning process. All these are indicative of the depth of learning that has taken place from the beginning to the end of the course.

Besides the positive responses reflected in the above Table 6.8, the four lecturers made very useful other comments. A summary of those comments is given below:

- The blended course environment was much more flexible, interactive, and student-centred unlike the traditional face-to-face classroom approaches;
- Content, assignment and assessments tied together logically and seamlessly;
- Activities and exercises kept everyone in the course busy;
- Students were more engaged in the learning processes than it is normally possible in only-face-to-face instructional approaches;
- Students seemed to enjoy working as a team in an environment that was purposefully designed and developed;
- The course was easily accessible and usable;
- All students posted a comment on the discussion topic and replied at least another student's comment;
- Every student sent at least one email to the tutor and to a peer in a week; responses from peers and the tutor were also found; there was indication of personalised communication between the tutor and individual students;
- The facilitation of blended environment was "well suited" to the progressive development and implementation of a learning-centred model of instruction;
- Face to-face sessions were mostly used to motivate students to engage in online activities and to further elaborate and reinforce concepts from online.

Thus, the two modes of delivery complemented each other, and encouraged students to take both modes seriously;

- Students must be encouraged to avoid long postings as they can be skipped by some students. Short postings are more often read and responded;
- One thing all the four respondents noted is that materials, including the ones from the WWW, were very specific; they commented positively because otherwise students may be overwhelmed with multiple tasks and too much information abundance of Internet resources leading to information overload;
- An interesting suggestion to improve the course is that students must be encouraged to keep an online journal of their learning experiences, and reflect on both the content and online experiences. This must be seen by the Course Tutor on a regular basis to see how the learner understanding evolves and support individually, if required at the appropriate time;
- An encouraging compliment from all the four experts is that the Course Tutor and the Researcher did an excellent job in employing technology in the way it should be actually used because today most tutors use technology only to make their traditional approaches easier. Related comments included: “Here the pedagogical use of technology was quiet evident”; “the Course Tutor and the Researcher could take lead in the institution-wide implementation of blended approach in a strict sense across the University”.
- One evaluator noted that interactions might die away over a period of time if it is not assessed; there will be more rich interactions between students if the quantity and quality of interactions were assessed and made part of the CA.

Owing to the innovative nature of this study, the four Expert Evaluators were so enthusiastic to participate in this study that they also wanted to witness the focus-group interview that the Researcher has planned with a selected group of students.

6.5.1.4 Focus-group interview

As discussed in Section 4.6.1 (iv), a representative sample was drawn from the participants of the final study; the focus-group interview was done three days after the

study was completed. Ten students were requested to meet the Researcher after their normal classes at 4:30 pm; only eight of them turned up; two of them could not make it due to other commitments. Eight participants were still enough for a focus-group interview as indicated in section 4.6.1 (iv). Two of the four Expert Evaluators were also present at the time of this interview; the other two could not make it due to other commitments. This exercise lasted for 75 minutes.

The Researcher administered simple questions based on their general responses earlier to the semi-structured items and the online survey. He also moderated the responses from the group; he further grouped and matched comments against corresponding responses from other sources. The whole purpose of the focus-group interview was to triangulate data from other sources.

One of those two students who could not come for the focus group interview came to the Researcher at a later time to apologise for her absence; however, the Researcher used it as an opportunity to carry out *member checking* into the findings using these two students. On the following day, the Researcher invited these two students at two different times and did a 'member checking' exercise with them. Thus, two member checking exercises were independently done in order to gain further data for establishing and increasing credibility of the research findings. Questions were drawn from semi-structured interviews, online surveys and focus-group interviews were posed to these two students to check whether they agree with the responses from other data collection strategies. The Researcher was able to conclude that responses from these two students as individuals were in close agreement with findings from other sources.

6.5.1.5 Triangulation

In addition to responses from semi-structured interviews, online student survey, expert evaluation and member checking, computer logs of students' actual engagement in online activities were tracked and analyzed by the Researcher to triangulate the interview and online survey data. All these data along with the Researcher's own views out of his participant observation were utilised to draw conclusions that are discussed in the next chapter, Section 7.5.

Tracking of WebCT log and participation hits showed that on average every student had visited the relevant pages on all week days from Mondays through Fridays for a time duration ranging from 30 to 80 minutes. As reported by the Expert Evaluators, there were evidences in the mail and discussion sections on WebCT for deep student engagement as a community and these would help students to achieve their learning goals. 30% (12 students) of hits lasted over 60 minutes. 15% (6 students) of visits were registered at late evening times or very early times in the morning, and half of this was from off campus. The number of hits over the four week ends ranged from 20 to 40%. The increased duration on WebCT was often noticed when students were required to submit an assignments.

6.6 Summary of the study findings

A set of strategies for facilitating the LAPTEL model based on clues from the literature, the Researcher's participant observation and discussions with the course tutor and expert evaluators was developed as an outcome of the pilot study. It was further refined as a result of further observations and ideas from the final study. The final recommended strategies for implementing the LAPTEL model effectively and efficiently are presented in Section 7.6.1. The following sections 6.61 and 6.6.2 present the summary of findings from the two surveys.

6.6.1 Semi-structured interviews

Notable points from the semi-structured survey/ interviews (Final study) based on data in Table 6.7 are present below.

Each domain (access, participation, tasks, engagement and learning) of the LAPTEL model had high ratings by the subjects, with Means ranging from 1.80 to 1.89 and the Mode values consistently equal to 2 (equivalent to a "YES" response).

a) Access (Item No. 1: Total M=1.89 and Mode=2 or YES)

b) Participation (Item No. 2: Total M=1.80 and Mode=2 or YES)

c) Tasks (Item No. 3: Total M=1.86 and Mode=2 or YES)

d) Engagement (Item No. 4: Overall M=1.88 and Mode=2 or YES)

e) Learning (Item No. 5: Total M=1.84 and Mode=2 or YES)

The high rating for learning component and the overall comment on the satisfaction of the model (Mean=1.92) are indications that effective student learning has occurred; this is evident in the responses to several items in both surveys; for example, in the student satisfaction survey, Item No.19 (This course improved my understanding of the content; M=4.03, σ= 0.89 and Mode=4 or Agree), Item No.23 (The blended approach used in this course was valuable; M=4.48, σ= 0.64 and Mode=5 or Strongly Agree) and total student satisfaction level at Mean=4.33 and Mode=5 (see Appendix G).

As argued by Moore, four types of interaction are critical for effective learning: student-content, student-teacher, peer-to-peer and student-interface interactions. Therefore, it is critical to look at the quality of these four interactions as reported by subjects in the study. Their indicators are as below with the highest being student-teacher interaction. The individual values are:

(i) Student-content interaction (Item No. 4.1: Total M=1.84 and Mode=2 or YES)

(ii) Student-teacher interaction (Item No. 4.2: Total M=1.96 and Mode=2 or YES)

(iii) Peer-to-peer interaction (Item No. 4.3: Total (M=1.88 and Mode=2 or YES)

(iv) Student-interface interaction (Item No. 4.4: Total M=1.84 and Mode=2 or YES)

The subject rated all these four types of interaction highly, with all the Mode values equal to 2 (equivalent to a “YES” response) and Mean values ranging from 1.84 to 1.96, with an average value of 1.88 which is significantly high.

Further, a Mean of 1.88 for both the overall student engagement and peer-to-peer interaction support the Researcher to conclude that the LAPTEL model, if appropriately used, has the potential to support both social and personalized learning. High student engagement is a critical factor for effective social learning. Social learning is based on creating and sharing information and knowledge within the learning community.

Other notable findings are:

- The high Means of assessments (1.84) and overall comments (1.92);
- That the Mean of students' overall comments (1.92) is close to the Mean of the total responses (1.87) for the entire interview / survey;
- That all values of Means were high and were close to a "YES" which is supported with a mode value of 2 (equivalent to "YES" response).

Further, all these findings were also confirmed through the focus-group interviews and member checking exercises. Thus, all in all, the Researcher wants to believe that the students had a learning environment that was conducive for learning to occur. Further, the confirmation of the results using different sources (triangulation) has helped to validate design and development of the instruments used in the study.

To sum up, the students rated all the above [(i) – (v)] discussed five domains of the LAPTEL model highly, with the entire Mode values equal to 2 (equivalent to a "YES" response) and Mean values ranging from 1.80 to 1.88. These values and a high Mean value of 1.92 for overall student satisfaction indicate that the students are in full agreement with each of the five domains – Access, Participation, Tasks, Engagement and Learning— of the LAPTEL model. This means that these domains fit well in the LAPTEL model. The support for the 'leadership' domain of the LAPTEL model came from the literature review and comments made by the Course Tutor and the Expert Evaluators during the case study with the model. This was discussed in Sections 3.14.1 and 5.8.1.1 and 7.5.1.

6.6.2 Online student satisfaction survey

All aspects peculiar to blended learning environments were included in the survey and they were all highly graded by the subjects (Mean=4.33 and Mode=5), and were commented positively by the Expert Evaluators. A value of 5 for Mode indicated that majority of the strongly agreed on their satisfaction for the LAPTEL model. Data from the online student satisfaction survey helped the Researcher to confirm the findings arrived at from the semi-structured interviews discussed above in Section 6.6.1. Findings from the two instruments enabled the Researcher take the position that

the LAPTEL model was satisfactory to the participants in providing them with the kind of learning experience that was determined by their learning needs and expectations. The final conclusion from the study is discussed in Section 7.5.

A notable finding from the graph in Fig. 6.11 is that three items had Mean scores lower that all other items and less than 4 (equivalent to agree).The items are:

a) Item No. 6: Amount of material covered and course workload were right. (M=3.93, σ = 0.97, Mode=4)

b) Item No. 7: Pace of the course was right (M=3.93, σ= 0.92, Mode=4)

c) Item No. 15: The instructor provided several ways for students to demonstrate understanding of important course concepts. (M=3.83, σ= 0.84, Mode=4)

Since the mean values are close to 4 and the Mode is also 4 in each case, the overall response is an “agree”; however, all these three item responses throw some important light on a couple of important things that should not be ignored. The Researcher’s inference is that learners are of different ability level, all students in a class should not be given the same work load and same duration to complete it; some of them require alternative learning tasks and increased time on task (Mastery learning), and as a result, they will require altogether different assessment strategies. In order to address the needs of such students, the Researcher recommends the need for a student-centred or personalised curriculum rather than a ‘one-size-fits- all’ type as discussed in Section 7.6 (i).

6.7 Summary

Based on the theoretically designed framework (Chapter 5), the LAPTEL model was developed and implemented twice, one as a pilot and the other for its final evaluation as part of the study. The most important aspect of the design and development of the online course tutorial in this study was that it used an iterative, user-centred, and team-based design process; it enabled the designer to try out their ideas at each stage with real users and to refine the process based on their feedback. The pilot helped to improve the implementation strategies, and to validate the survey instruments. The overall student satisfaction in respect of each component of the model was in the range from Agree to Strongly Agree. There was increased student engagement and satisfaction in the blended learning environment created using the LAPTEL model. Satisfaction of clients is the key in any business that also includes higher education landscape, and that has been achieved. The next chapter discuss the study's contribution to knowledge (Section 7.3), its contribution to UB and towards the national development (Section 7.4), conclusion from the study (Section 7.5), recommendations from the study findings (Section 7.6) and recommendations for further research.