Improvisation in Educational Delivery by System Simulation and Management: Compressed, On-Demand On-Line (COOL) Courses

Hamid Khan, Our Lady of the Lake University

EXECUTIVE SUMMARY

Higher education is in a state of flux. The educational priorities do not seem to be very clear except frantic cost-cutting measures. The pundits in education offered various kinds of solutions and multifarious combinations, thereof. Lurking was Internet education that came forward hurriedly and defeated all rivals by being amenable to marvelous improvisation. Using the Internet, education could be delivered on demand, online, fast-track, compressed and in modular formats. So the experiment led to offering many contested but rival programs against face-to-face programs. This paper presents some forms of educational delivery that have been tried, and compares the effectiveness of some with the others, and concludes that, even the most compressed delivery and most demanding completion schedule of only eight weeks duration in a fully structured, regimented and demanding format, may yet fulfill the competitive and effective nature of learning environment.

Keywords: Educational delivery, Education effectiveness, Learning environment

IDEATION USING SYSTEM SIMULATION FOR STEADY STATE VISUALIZATION

The visualization for competitiveness is important for any design of Compressed, On-Demand On-Line (COOL) Courses. Two systems approaches were taken for design of such courses. First of simulation was made to see if such courses were feasible. Second a project management software was used to see the design and implementation objectives of the course. In the MBA level fundamentals of business administration course, which is affectionately called by the students as a boot camp course, six fundamental course was where designed in modular form and they are, accounting, business law, economics, finance, management, and statistics. All this six courses where designed in a modular form, to be delivered online in two separate modes e.g. the 16 week format and to eight-week formats. In both these designs simulation software was used to simulate the number of students that would enter the system at the beginning of the program and come out of the system at the end of eight weeks as standalone using a Moodle LMS platform, and 16 weeks using the Blackboard LMS platform. Such a design has been simulated using general purpose system simulation. After the simulation the implementation part has been designed by using the project management software. The methodology has been shown below.

General Purpose System Simulation (GPSS) Of 8 Week MBA Boot Camp

```
Student GPSS/H Release 3.70 (UN253)    11 Jul 2013   18:48:02    File: gpssdeltak2.gps

Line# Stmt#  If Do  Block#  *Loc            Operation  A,B,C,D,E,F,G        Comments

1    1                      SIMULATE                  Case Study OF SUMMER II, 2013
2    2              *                      OLLU Course Quality Control Prediction Model
3    3              *                     Base Time Unit: 1 Week
4    4              ***************************************************************************
5    5              *       Control Statements (STORAGE)                      *
6    6              ***************************************************************************
7    7              *
8    8               ADVISER  STORAGE   2                    ADVISER at ADMISSION station
9    9              *
10   10               ***************************************************************************
11   11               *       Model Segment 1 (Last ADMIT Station)                *
```

```
12  12          ************************************************************************
13  13          *
14  14        1       GENERATE   1,.5                  STUDENTS arrive, one by one, from
15  15          *                                       the preceding APPLICANT station
16  16        2       ADMIT8W1 QUEUE     EIGHTWK1     Start EIGHTWEEK Queue membership
17  17        3        ENTER       ADVISER             Request/capture an ADVISER
18  18        4        DEPART      EIGHTWK1            end EIGHTWK Queue membership
19  19        5        LEAVE       ADVISER             Let the adiser go
20  20        6        SEIZE       TEACHER
21  21        7        ADVANCE     8,0                 STUDY AND TESTING time
22  22        8        RELEASE     TEACHER             Let the teacher go
23  23          *
24  24        9       TRANSFER   .90,,ADMIT8W2         90% must GO TO ADMIT8W2 (READMIT)
25  25          *
26  26       10        TERMINATE  1                    The rest GO out of system
27  27          *
28  28          ************************************************************************
29  29          *       Model Segment 2 (Adjustment Station)                 *
30  30          ************************************************************************
31  31          *
32  32       11        ADMIT8W2 QUEUE     EIGHTWK2     Start EIGHTWK2 Queue membership
33  33       12        SEIZE       TEACHER             Request/capture the TEACHER
34  34       13        DEPART      EIGHTWK2            End EIGHTWK2 Queue membership
35  35       14        ADVANCE     8,0                 STUDY AND TESTING time
36  36       15        RELEASE     TEACHER             Free the TEACHER
37  37       16        TRANSFER   .10,,ADMIT8W1        Transfer to ADMIT8W1
38  38          *
39  39       17        TERMINATE  1
40  40          ************************************************************************
41  41          *       Run-Control Statements                       *
42  42          ************************************************************************
43  43          *
44  44                START      50                   Set TC=50; start Xact movement
45  45          *
46  46                END                             End of Model-File execution
```

Facilities: 1=TEACHER

Queues: 1=EIGHTWK1 2=EIGHTWK2

Storages: 1=ADVISER

Symbol	Value	EQU Defns	Context	References by Statement Number
ADMIT8W1	2	16	Block	37
ADMIT8W2	11	32	Block	24
TEACHER	1		Facility	20 22 33 36
EIGHTWK1	1		Queue	16 18
EIGHTWK2	2		Queue	32 34
ADVISER	1	8	Storage	17 19

Block	Current	Total	Block	Current	Total
1		90	**ADMIT8W2**		6
ADMIT8W1		91	12		6
3		91	13		6

4		91	14	6			
5		85	91	5			
6		6	16	5			
7		6	17	4			
8		6					
9		6					
10		0					
91	"BIRTH" 1	CEC		93.5757	93.5757	0	00371480

FUTURE EVENTS CHAIN

--Avg-Util-During--									
Facility	Total	Avail	Unavl	Entries	Average	Current	Percent	Seizing	Preempting
	Time	Time	Time		Time/Xact	Status	Avail	Xact	Xact
TEACHER	**0.992**			**12**	7.734	AVAIL		5	

--Avg-Util-During--										
Storage	Total	Avail	Unavl	Entries	Average	Current	Percent	Capacity	Average	Current	Maximum
	Time	Time	Time		Time/Unit	Status	Avail		Contents	Contents	Contents
ADVISER	0.000			**91**	0.000	AVAIL	100.0	2	0.000	0	1

Queue	Maximum	Average	Total	Zero	Percent	Average	$Average	Qtable	Current
	Contents	Contents	Entries	Entries	Zeros	Time/Unit	Time/Unit	Number	Contents
EIGHTWK1	1	0.000	**91**	91	100.0	0.000	0.000	0	
EIGHTWK2	1	0.000	**6**	6	100.0	0.000	0.000	0	

Simulation complete. Absolute Clock: 93.5757

IMPLEMENTATION USING THE PROJECT MANAGEMENT SOFTWARE

Background and Methodology of Design

The course was first offered face to face in 2003, and then the modified format was the hybrid format. Two of the six topics were covered in face-to-face classroom settings (Management and Business Law & Ethics). The face-to-face meetings were each, 1 day per topic. The students were required to have read all of the assigned material prior to coming to the class. During the 8-hour class, a professor would lecture and lead discussions on highlights from the assigned readings. An exam was given at the end of the day over the material. The other four topics (Economics, Accounting, Finance, and Statistics) were done in an online format using MBA Primer (Thomson Southwestern). Students would take quizzes and then an exam for each topic. MBA Primer is a self-paced format.

There were several reasons for changing format. First, it was author's opinion that the hybrid format was not conducive to tracking and monitoring student performance. Second, it did not provide enough opportunity for interaction between students and the instructor. Third, the responsibility for learning rested solely with the student. Finally, it was difficult to assess with

any degree of certainty how much the student had learned. Therefore, the author redesigned the course as a completely online course using WebCT as the online platform.

Two more questions that need answered: 1) Why online? and 2) How was the course constructed as an online course? The online environment was chosen to accommodate students from any location. OLLU has a campus in San Antonio and in Houston, Texas. Going to an online environment reduced the need for instructor travel for the face-to-face settings. Also, going to an online format reduced the need for two instructors. One instructor can facilitate the class resulting in additional cost savings for the university.

Leveling courses are foundation courses. Meaning they are courses that all undergraduate business students would take. They typically cover the introductory concepts, theories, and terminology of the respective subjects that students will need for upper-level classes. Subject matter experts (SME) within OLLU's School of Business were identified for each of the six topics. The SMEs were asked to identify the undergraduate textbook used for each subject. They further were asked to identify the required chapters that should be covered in each textbook that would provide students with a good foundation in the subject area. Armed with this information and having obtained the textbooks and the supplemental materials, the course was constructed by adapting a methodology the author learned from a presentation by Gordon Hodge from the University of New Mexico (UNM). The UNM redesigned General Psychology, the largest and most popular undergraduate course, through a grant from the Center for Academic Transformation (Hodge).

It was determined that the sequence of the six topics would be Management, Business Law & Ethics, Economics, Accounting, Finance, and Statistics. The Test Banks for each textbook were loaded into WebCT through the use of Respondus™. Each chapter had a test bank of questions. In addition a "combined" test bank was compiled by using all of the questions from each chapter. Students move through the course in two-week increments. In other words, everyone works on Management, then Business Law and so on. Students are required to take a minimum of one quiz on each assigned chapter. However, they are encouraged to take as many quizzes as they like. The 10-question quizzes are randomly generated from the respective chapter test banks. So they will not be getting the same quiz each time. Why would a student want to take more than one quiz on each chapter? Simple, the 100-question final exam is randomly generated from the combined test bank. Therefore, the more quizzes a student takes the higher the probability the student will have seen most, if not all, of the questions on the final.

Students read an assigned chapter and then take multiple quizzes. According to the results of the UNM program, the repetition results in a higher retention of the information (Hodge). The more quizzes they take the more prepared they are for the Final Exam. Like the course itself, the grading in the course is quite different. Each of the six topical areas is independent of the others. In order to be admitted into the MBA program, without conditions, a student must pass each of the six areas. A final exam is given in each area. Students must receive a 70% or higher on a final exam in order to pass the area. So, students getting a 70% or higher in each of the six areas, are admitted, without conditions into the MBA program. Students failing to get a 70% or higher in one or more areas must take the undergraduate course for that area, prior to being admitted into the MBA program. Students are required to sign an acknowledgement form verifying they understand the requirements of the course. This form is administered during the 2-hour orientation for the class. The orientation is a 2-hour face-to-face meeting where the instructor goes over the syllabus, course format, grading criteria, and introduction to WebCT. This format allows the instructor to monitor progress very easily. An instructor can observe quiz scores and intervene if a student is getting consistently low quiz scores. Also, the course was set up to have a discussion area for each topic. Therefore, students can post questions concerning the material or questions concerning quizzes in the discussion area. Students can also interact with the instructor and other students through email. After the design methodology was set in place, the time allowed for completing the modules and the implementation plan were modeled by the following way.

Project Implementation Plan

Activity	Description	Preceding Activity	Activity Time
			In Days
A	Graduate School Approval	None	5
B	Course construction Plans	A	15
C	Projected Students—Study	A	10
D	Lead Faculty Availability Check	A	5
	"The Platform faculty"		

E	Internal Feasibility Report	B, C	15
F	VPAA/EVP Approvals	B, C, D	10
G	Design of Individual Modules	F	170
H	Publish on Blackboard/ Dry Run	E, G	35

FIGURE 1
Precedence Matrix Plan

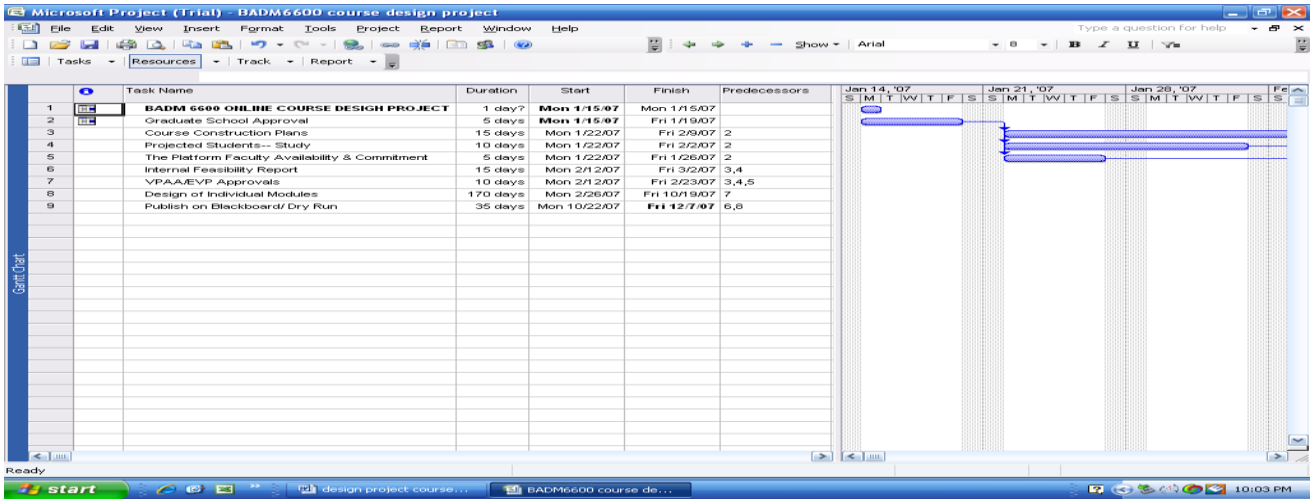

FIGURE 2
PM Gantt Chart for Controlling Precedence Matrix

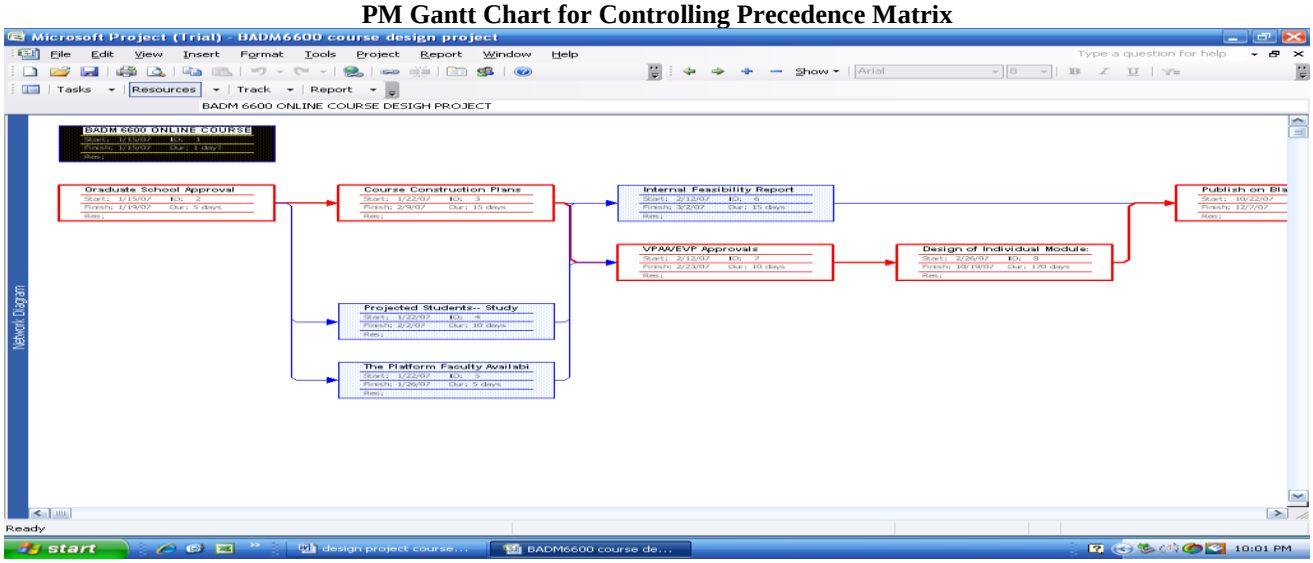

FIGURE 3
The Network Diagram for Resource and Critical Path

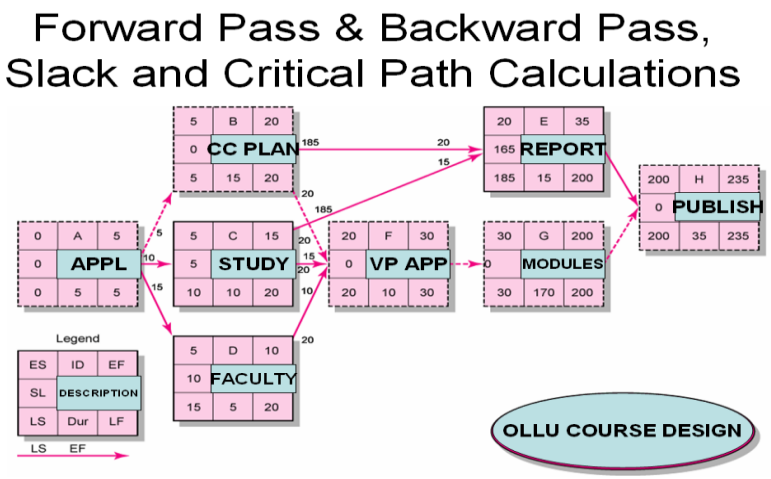

FIGURE 4
'Activity on Node (AON)' Diagram for Critical Activities and Path
Original Time Estimates (In Days)

Activity	optimistic	most probable	pessimistic	expected time	variance
a	m	b	t=(a+4m+b)/6	[(b-a)/6]^2	
A	4	5	6	5	.11
B	12	15	18	15	1
C	8	10	12	10	.11
D	4	5	6	5	.11
E	10	12	14	12	.11
F	8	10	12	10	.11
G	140	170	200	170	100
H	30	35	40	35	2.78

Project Implementation Schedule with Slack Times

Activity	**earliest start**	**earliest finish**	**latest start**	**latest finish**	**slack LS-ES**	**on critical path? Y/N**
A	0	5	0	5	0	Y*
B	5	20	5	20	0	Y*
C	5	15	10	20	5	N
D	5	10	15	20	10	N
E	20	35	185	200	165	N
F	20	30	20	30	0	Y*
G	30	200	30	200	0	Y*
H	200	235	200	235	0	Y*

The above PERT schedule uses critical path activities to help determine the variance of the overall project. The project variance is (.11+ 1 + .11+ 100+ 2.78) = 104 days

Project standard deviation is sq.rt. of 104 = 10.2 days

Expected date of completion of the critical path is (5 +15+10+170+35) = 245

In order for the school to find the probability that this project will be finished on or before the December 31 deadline or in 235 working days, we need to determine the area under the normal curve, where the standard equation can be applied as follows:

Z = (Due date – Expected date of completion)/ Standard deviation = (235-245)/ 10.2 = -.98 where Z is the number of standard deviations the due date or the target date lies from the expected date (to the left of the mean).

Referring to the normal table we find a probability of success is .33646 or 33.6%. (very low)

The project cannot be completed with these estimated times. It was in trouble if it was expected to be completed in 245 days.

Revised Time Estimate in Days/ Probabilistic Functions

Activity	optimistic	most probable	pessimistic	expected time	variance
	a	m	b	t=(a+4m+b)/6	[(b-a)/6]^2
A	3	4	5	4	.11
B	10	12	15	12.2	.7
C	6	8	10	8	.44
D	3	4	5	4	.11
E	10	12	15	12.2	.7
F	6	8	10	8	.44
G	100	140	170	138.3	136
H	20	25	35	25.8	6.25

Revised Schedule and Slack Times/ Risk and Probability of Success

Activity	earliest start	earliest finish	latest start	latest finish	slack LS-ES	on critical path? Y/N
A	0	5	0	5	0	Y*
B	5	20	5	20	0	Y*
C	5	15	10	20	5	N
D	5	10	15	20	10	N
E	20	35	185	200	165	N
F	20	30	20	30	0	Y*
G	30	200	30	200	0	Y*
H	200	235	200	235	0	Y*

The above PERT schedule uses critical path activities to help determine the variance of the overall project. The project variance is (.11+ .7+ .44+ 136+ 6.25) = 143.5 days

Project standard deviation is sq.rt. of 143.5 = 11.98 days

Expected date of completion in the critical path is (4 + 12.2 + 8 + 138.3 + 25.8) = 188.3

In order for us to find the probability that this project will be finished on or before the December 31 deadline or in 235 working days, we need to determine the area under the normal curve, where the standard equation can be applied as follows:

Z = (Due date – Expected date of completion)/ Standard deviation = (235-188.3)/ 11.98 = 2.92 where Z is the number of standard deviations the due date or the target date lies from the expected date.

Referring to the normal table we find a probability of success is .99819 or 99.8%. (very high). The project was, in fact, completed in time and published in Blackboard LMS for our long 16 week integrated boot camp course and in Engage LMS for integrated 8 week boot camp course and was successfully delivered on line the following spring semester (2012) and every semester afterward.

The management boot camps run by Blackboard and Engage have achieved their steady state enrollments enticing or inviting the prospective ambitious students to complete their Foundations courses in either 16 weeks or in tandem duration of 8 weeks. Some students with enough background preparation can finish in 8 weeks to migrate successfully to their coveted MBA programs with great spirit and motivation.

REFERENCES

Hodge, G. (2005). Program in course redesign – The University of New Mexico, General Psychology Course. 13 February 2006.

Southwestern Cengage Learning. MBA Primer. July 14, 2013. Retrieved from http://v2.mbaprimer.com/acct/index2.html