Quality Assurance (QA) in On-Line Learning Courses: Prospects and Possibilities- A Case Study

Kuldeep Nagi*

Abstract

A case study is an intensive analysis of an individual unit (e.g., a person, group, or event) stressing underlying factors leading to its success or failures. In context of eLearning it is about gauging or measuring the usage of the learning objects (LOs) or components of a courseware and how a small group of learners are using them for enhancing their learning. This case study investigates the level of usage of LOs or components in an eLearning courseware by examining user's activity logs recorded into the database of a Learning Management System (LMS). As a more direct example, the Moodle "Reports", a tool provided within the LMS is used as a research instrument to understand the level of usage of LOs or components in a virtual learning environment (VLE). The results of the analysis of these logs can be easily used by instructors and trainers to evaluate learner's activities and identify on-line behaviors and interaction patterns during the delivery of a courseware. Information provided by these logs can be used for analyzing and improving the quality of LOs or components. In a nutshell, this paper focuses on a simple strategy of using system logs to assess quality assurance (QA) in on-line courses.

* Fulbright Fellow (USA) & Faculty College of Internet Distance Education
Assumption University, Bangkok, Thailand
E-mail: Knagi@au.edu

Introduction

There is a long history, not always a glorious one, of using technology to support teaching and learning in classroom based education. In the last century, new tools and technologies have been used to supplement classroom teaching. USA, Europe, Japan and Australia have lead the way in supplementing classroom teaching with new technologies. The old fashioned F2F teaching have been using slate, chalk, blackboard, textbooks, flip-charts, butcher papers, laboratory equipment, radio, films, television, the overhead projector and computers. For a long time use of such solutions for classroom teaching has been slow in other parts of the world. Only recently, with the advent of Internet and increasing globalization the use of computers in classrooms has increased world-wide. Now computers are commonly used for PowerPoint presentations to deliver lectures, and support classroom teaching. Using technology to enhance classroom teaching has not radically changed the F2F teaching methods. It merely enhances what is already being done in the classroom. In spite of increased usage of technology in F2F teaching it is hard to show a quantifiable correlation between the uses of technology in classrooms and improved learning outcomes.

However, the advent of Internet and its rapid world-wide expansion has resulted in drastic changes in teaching and learning and training. The Internet, high quality digital content and cloud computing is now driving innovations in on-line learning. Some have argued that 'eLearning' is of a revolutionary nature, resulting in a paradigm shift, no less, comparable to the invention of the printing press in its significance in traditional F2F education.

Technologies are changing the mode of creation, distribution and consumption of knowledge. But the use of these new and emerging technologies are not fully understood by policy makers, presidents, principals and others concerned with business of education and training. Based on the current trends we can divide education in four major categories of teaching and learning. With both technology-enhanced classroom teaching and with rapid expansion of Internet, the move towards on-line learning or eLearning could be seen as evolutionary, a gigantic step forward in changing the way we create and consume information. In other words, it is potentially a revolutionary development because it is radically

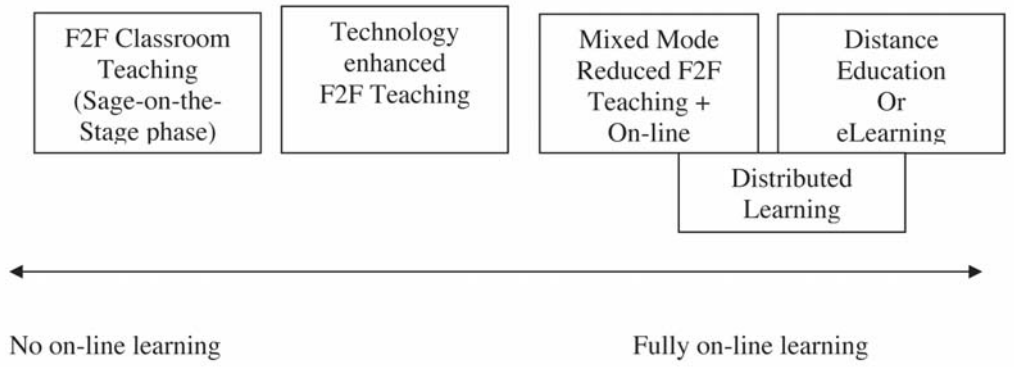

Figure 1: Evolution of On-line Learning (based on UNESCO Report [1])

changing the role of traditional educational organizations. This evolutionary process is depicted in the Figure 1 given above. The theme of Figure-1 can be further clarified from the Sloan Consortium papers which are briefly summarized below. While there is a great deal of diversity among course delivery methods used by individual instructors, the following four categories are listed below to illustrate the prototypical classification used for education [2].

i. Traditional- Proportion of Content delivered on-line- 0%

A course with no on-line technology used- content is delivered in writing or orally.

ii. Web Facilitated- Proportion of Content delivered on-line- 1%-29%

A course that uses web-based technology to facilitate what is essentially a face-to-face course. It may use a course management system (CMS) or web pages to post the syllabus and assignments.

iii. Blended/Hybrid- Proportion of Content delivered on-line-30%-79%

A course that blends on-line and face-to-face (F2F) deliver. Substantial proportion of the content is delivered on-line, typically uses on-line discussions and has a reduced number of face-to-face (F2F) meetings.

iv. On-line- Proportion of Content delivered on-line= 80 + %

For on-line learning all the information and knowledge is delivered on-line.

What We mean by Quality of Courseware?

In this new age of interaction various on-line services such as Facebook, MySpace, Twitter, LinkedIn, You-Tube, Wikipedia and host of others services are becoming primary source of learning and knowledge sharing. These services are also becoming an integral part of user's personal learning environment. Quality of these on-line services is mainly defined by the number of users or subscribers. More subscribers or users mean a better quality. Hence in these on-line services quantity drives the quality.

However, quality of a learning experience is based on innumerable factors. Traditionally, quality of teaching and learning in a F2F classroom has been largely dependent on the quality of instructors and instruction. If an instructor was able to effectively meet the objectives of a courseware, it was hailed as a success. In a nutshell, in F2F setting is largely instructor centered. This sage-on-the-stage model has been part of the century old traditional educational system. As listed in Table-1 a well structured F2F course consists of various traditional components ranging from a prescribed text book to a series of exams. Sometimes, to evaluate the quality of learning in F2F setting a survey is conducted at the end of the semester asking students about their views about the course and their experiences. Subjective elements in such surveys cannot capture the quality of overall learning in a F2F setting. And of course, there are so many other ways to gauge the success or failure of courseware delivered in a F2F environment. In conclusion, in F2F environment elements of quality are solely driven by the instructor, not by the users or students.

On the other hand, eLearning or on-line learning is based on three key elements to achieving "quality": *components, processes, and learners or users*. User's experiences drive the quality and expect-among other things-increased performance, reliability, efficient delivery of services and measurable learning outcomes[3]. When compared to a traditional F2F course, a typical eLearning courseware has several additional components which are listed in the Table 1. On-line learning is largely driven by processes and user demands and interests. Striving for quality in an on-line courseware requires an academic organization to look at its business from the user's perspective, not its own. Let us first briefly examine the key components of a courseware created for F2F as well as for on-line delivery.

i. Course Components

F2F courses are primarily designed by the instructors. The task of selecting a text book to grading the exams is all done by the instructors. Concepts are explained by chalk-and-talk method with a little or no discussion in the classroom. Most of the time in F2F settings, large class size lead to minimum interaction with the instructor.

Table 1: Core Components of a Courseware- A Comparison

F2F Course	On-line Course
A Text Book	A Text Book (eBook)
Lecture Notes (ppts or pdf files)	Lecture Notes (ppts or pdf files)
Class Case study (individual or group)	On-line Class case study (individual or group)
Assignments (individual or group)	Assignments (individual or group)
Quizzes	Quizzes
Term Papers	Term Papers
Project/s (individual or group)	Project/s (individual or group)
Examinations	Forums
	On-line VDOs
	On-line Audio & Podcasts
	Blogs & Social Networks
	Examinations

ii. Delivery Processes

The old fashioned teaching and learning is confined to the classroom where instructor plays a major role in the delivery process. Current technologies used for on-line teaching and learning refer to the designs, environments and a user interface (UI) that engages learners. An example of a UI is shown in Figure 2.

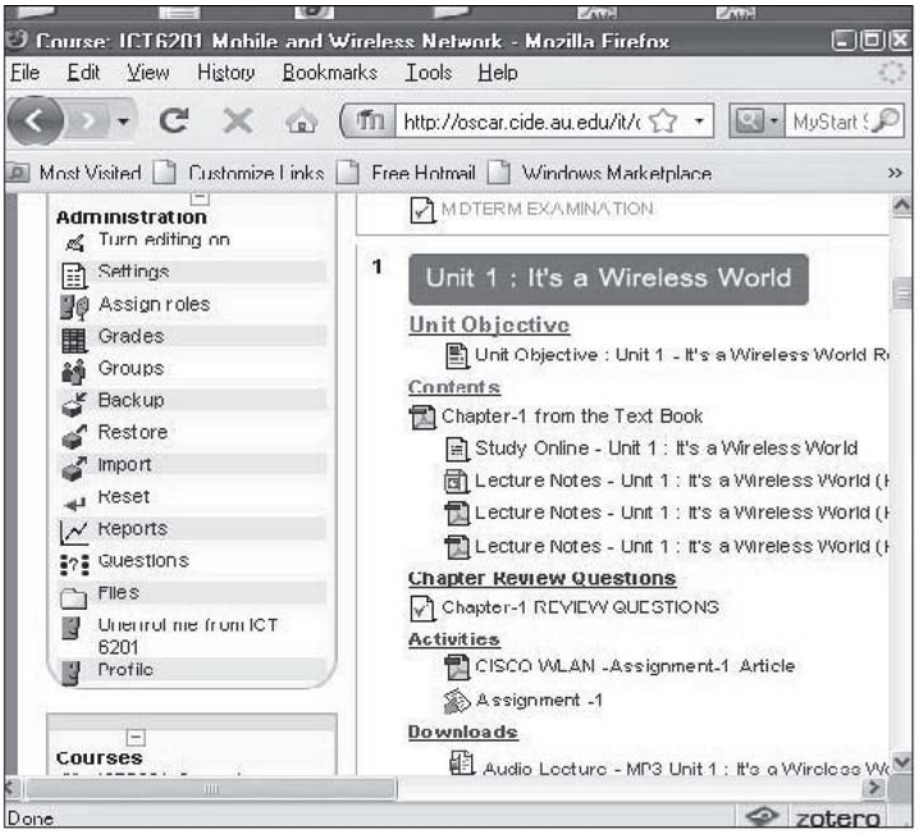

Figure 2: LMS and Learning Objects (LOs) or Components

When compared to F2F teaching the VLEs also has a context in which knowledge building tools such as LOs can be customized for understanding a concept. In an eLearning or eTraining program all courseware components are hosted in LMS, a software platform. LMS also requires installation of a server operating system, a web server application and a database such as Microsoft SQL or open-source MySQL. It is possible to integrate an LMS with other types of databases besides the two mentioned above. All LMSs provide a set of administrative tools in its menu. The left pane of an LMS user interface in case of Moodle is shown in Figure 2. It consists of a series of items starting under the Administration Tools. The menu includes tools such as Turn Editing On, Assignments, Grades, Groups, Backup, Restore, Import, Reset, Reports, Questions, Files etc. These set of tools can be customized according to the needs of an eLearning or eTraining courseware. The "e" in eLearning signifies

any electronic device ranging from a PC, laptop and a notebook to a mobile phone. Besides a device, another thing that is critical is connectivity. A device can provide a user interface (UI) ranging from a small size screen of a smart phone (e.g. iPhone and Samsung Galaxy) to a larger display in a PC or a laptop [4].

iii. Learner or Users

In a traditional F2F environment a learner or user is largely a recipient of information. The teaching learning process remains one way- from instructor to the learners. Whereas in on-line learning a VLE is a space where learners can study together and support each other as they use a variety of tools, LOs or components in their pursuit of learning goals and problem solving activities. On-line multi-player game is a good example of how technology can engage a user and how step by step a learner can sort out a solution to problems by self exploring the clues and contexts. In this sense, learners in a VLE act more like active participants rather than a passive recipient. The relevance of eLearning in modern education cannot be doubted or debated anymore. Today the students learn continuously from their environment and the Internet has become an integral part of their living. In some way or the other, it deeply touches their lives on a daily basis.

The Case Study in Quality Assurance (QA)

How does a case study of eLearning courseware require an organization to select a scenario? The answer is as unique and customized as the organization making the choice. A successful case study involves several steps: clear identification of an instructional problem or issues; a review of available tools; an adoption strategy; the adoption process; continued support; and ongoing assessment. Throughout, the implementation approach a case study should also be periodically reviewed. The teaching and learning environment is alive and dynamic, as should be its study.

eLearning courses require system design that can support learning through a variety of devices that connect to the Internet. It is essential and important to understand that eLearning is not just complimentary or a standalone solution. It can bring high levels of interactivity and engage students in an active learning process suited to their personal needs and

abilities, hence, giving them an immersive learning experience through their own VLE. A new premise for eLearning requires that an organization- be it a corporation, school, college, university or any other entity-should provide a media rich interactive learning content to its users. In the end, it is the quality of learning experience in a VLE that is paramount.

Methodology

This case study was conducted using 8 eLearning courses taught at a local university. These courses were offered as a part of degree program and were taught on-line. All course modules, units and components were hosted on an open-source LMS called Moodle[7]. Many private and public sector organizations use Moodle as their LMS for providing digital content for on-line teaching and training. Data about these 8 courses was collected over 12 weeks. The main instruments used in this case study are as follows:

i. Transaction logs of 8 courses obtained through Moodle Reports

Although Moodle provide many other tools in its menu, this case study was primarily focused on using the "Reports" as a major instrument for collecting user data. Moodle reports are basically log files that contain data about on-line sessions. This tool is designed to capture data about range of processes occurring within the LMS. The conference data about LOs and learning activities of every user is stored in the database for future processing and analysis [5].

During the process of reviewing other case studies about on-line learning it was found that "activities" provided in an eLearning courseware were equated with "interactivity." As described earlier, in F2F environment courseware components such as assignments and exams are termed as "activities" and are widely used as a means of learning. While teaching eLearning courses this author wanted to explore issue of usage and interactivity further, which led this work to look for more specific components in an eLearning courseware? In a LMS a user can login as a student, instructor or as an administrator. When a user logs into the system, it automatically assigns a time stamp and extracts the user's identification (ID) to update the database. As shown in Figure 3, the LMS then logs all the activities that a user will be involved in. Users can participate in several activities using various LOs or components available in the courseware[6].

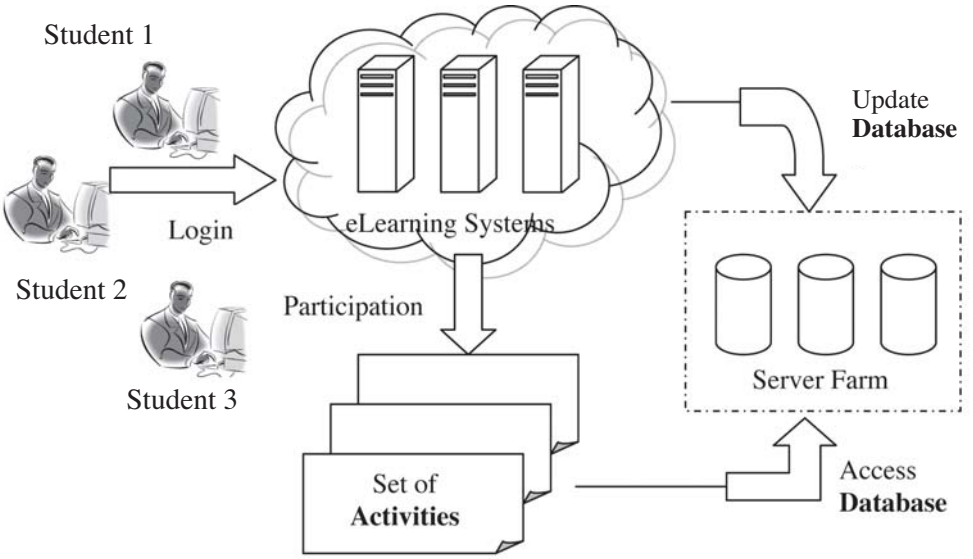

Figure 3: LMS Interact System

Case Questions

To keep the focus on the technical aspects of this case study following two questions were setup for exploration.

Case Question 1

Can the statistics gathered from system *Reports* containing huge amount of conference data in its activity logs be used to examine the usability of various learning objects (LOs) or components in an eLearning courseware?

Case Question 2

Can the results obtained from statistical analysis of system Reports be used to improve the quality of key LOs or components in an eLearning courseware?

These two case questions were at the heart of this case study. The entire research process adopted for this case study is illustrated in Figure 4. This figure captures the essence of this work. Two key data sets used for this case study were the *logs* and *views* and *posts* and conference data captured in *activity logs*. Both of these data sets were acquired through the "Reports", a tool available in the menu of the LMS[7].

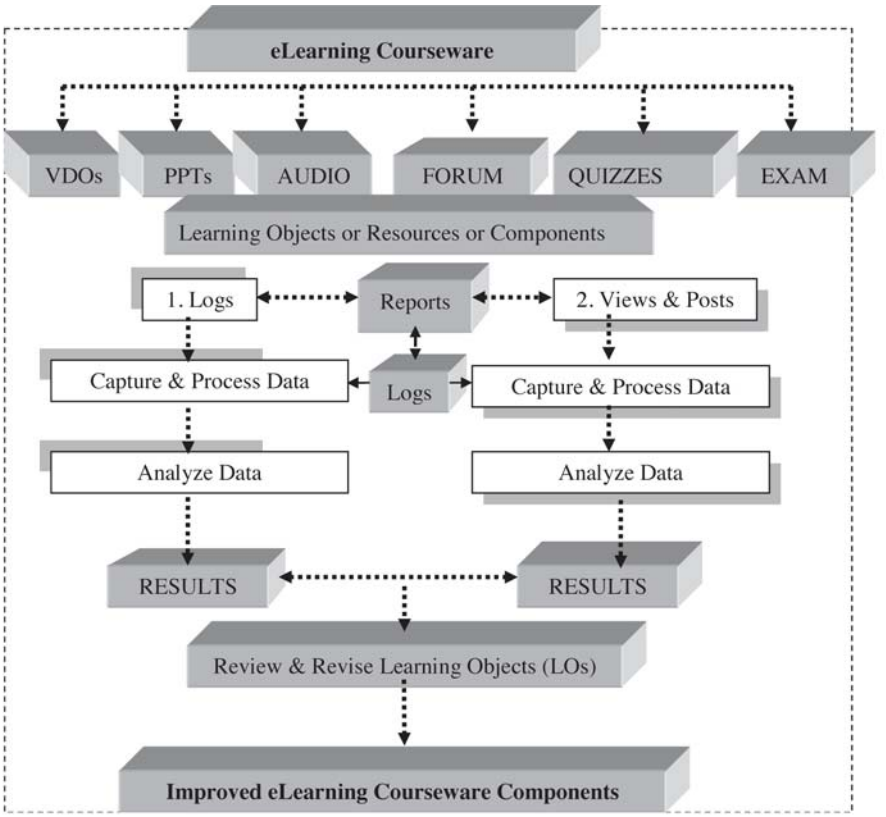

Figure 4: eLearning Courseware Improvement Process

Data Collection

The data collection was planned for a year starting with Semester 2/2009 through Semester 1/2010. The 8 randomly selected classes and their composition in Shown in Table 2. The first column lists the 8 classes included in the sample; the second column lists the number of students in each class. The category OTHERS shown in last column include instructor/s, facilitators or an ICT staff assigned to a courseware. As shown in this table the number of students enrolled in 8 courses ranged from a minimum of 3 to a maximum of 16. The total number of students in this sample of 8 classes was 70 who at various times enrolled in several different courses. For all practical purposes the focus of this case study was on the LOs or components that are used by these 70 students during the course of their studies.

Table 2: Class Sample

Code	Students	Others
ICT-1	4	3
ICT-2	16	4
ICT-3	15	2
ICT-4	7	2
ICT-5	3	2
ICT-6	13	2
ICT-7	7	3
ICT-8	5	2
	Total = 70	**21**

A sample of how the raw data looks in a system log file obtained through "Reports" is shown in the Figure 5. A log file may have large number of entries ranging from few hundred to several thousands. Log file size for the 8 sample classes chosen for this case study is shown below in Table 3.

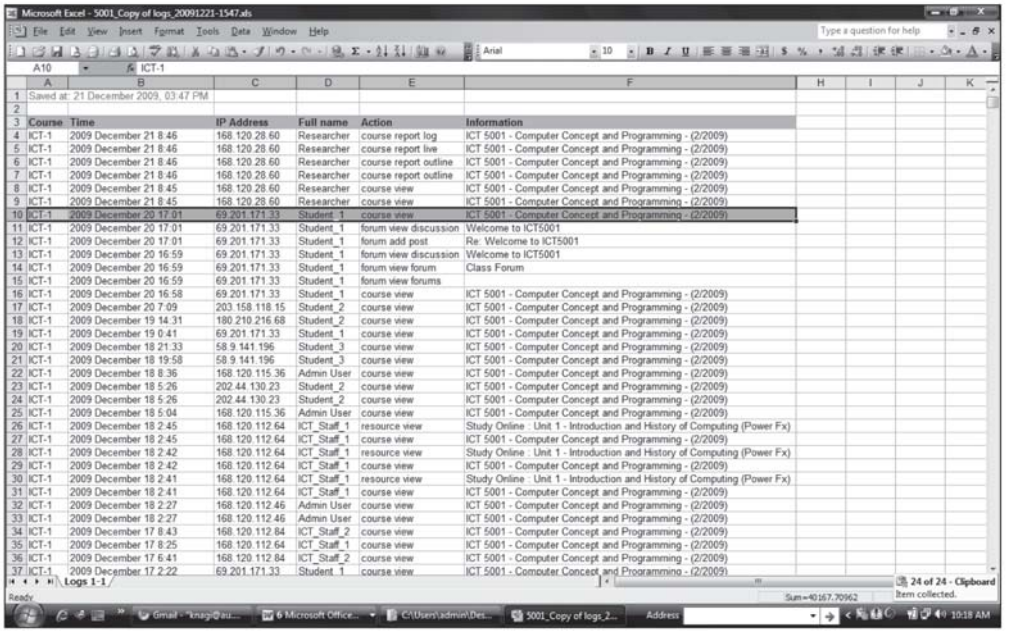

Figure 5: Partial Log Sample Course in Excel

A closer look at these files reveals the actions and activities of all the participants who accessed the LMS. Along with the time stamp a log file also contains the IP address of the computer used to connect to the system.

Table 3: Log File Size of Sample Classes

Code	Log Size Entries
ICT-1	1847
ICT-2	3530
ICT-3	4541
ICT-4	2158*
ICT-5	3724*
ICT-6	5992
ICT-7	4553
ICT-8	1333
Total Count	**21,796**

(*based on 8 weeks of data)

Activity logs also contain data about access and use of each and every LO or component provided in a courseware. In a nutshell, a log file can be called a comprehensive instrument with every detail about a session with the LMS. It can also be used as an empirical evidence for LOs or component usage by the clients. Due to sudden failure in the LMS the data for 2 classes, ICT-4 and ICT-5 was partially lost. Hence the data for these 2 courses was collected for 8 weeks, a shorter period when compared to others where data were available for the whole semester. Table 3 given below reveals that ICT-7 has the smallest logs with just 1333 entries and the largest log entries are shown for ICT-6. Total number of entries in all the 8 logs is 21,796. This case study is largely derived from these 21,796 entries available in the 8 logs obtained for 8 courses hosted in the LMS.

Tables 4 given below constitute the core of this case study. It shows the number of units or chapter is each courseware. It also shows total number of LOs or components provided for each unit. The second column lists the total number of units or chapters in each courseware and the last column provides the number of core LOs or components provided in each unit or chapter of a courseware. The courses were selected at random and

data collection started on September 2009 and ended in August 2010. The actual titles of the courses and details about students have been removed to accommodate concerns about privacy of information. The names of instructors, students also been excluded so as keep the record confidential.

Table 4: eLearning Courseware and Number of Chapters and LOs/Unit

Code	Units	LOs / Unit
ICT-1	13	6
ICT-4	14	4
ICT-2	15	8
ICT-3	13	7
ICT-5	12	9
ICT-6	11	8
ICT-7	13	7
ICT-8	14	7

As mentioned earlier, for this case study entire data is collected using "Reports", a tool provided in the LMS. The two data sets- *views* and *posts* and activity *log files* were utilized to examine the usage level of LOs or components of a courseware. Since the size of the log file of all activities is very large only a partial data of a log file is shown in the Figure 5.

As a part of this case study the first and foremost step was to analyze the data of all activities obtained from the logs. After the logs were downloaded into the Microsoft Excel files, the next step was to recode the data. This step included manually removing the class and student information from the logs. As the main focus of the case study was to gauge the usage of LOs or components of a courseware, it required mapping of user *action to a corresponding* LO or the component. For example, the "course view" was coded as LO1, "forum view and discussion" was coded as LO5 and "course view" was coded as LO7. To make it a bit more clear the LOs such as "resource view" simply meant that the home page of the courseware website was accessed by the student. "Study on-line" or the on-line VDO is coded as LO2 and an audio file (MP3/MP4) were labeled as LO4. Mapping of LOs for all the 8 classes was done manually. The actual number of LOs in on-line courses can go up to 24 or more.

The LMS has its own coding process for object access and corresponding action on the object.

As a sample of action mapping to TOP 5-LOs or components selected for this case study are shown in Table 4.

Table 4: Mapping Actions to 5-key LOs or Components

Action	LO Mapping	Action/ Mapping
Course view	LO1	Class Web site login
Study On-line	LO2	Study on-line VDOs in PowerFx
Lecture Notes	LO3	Lectures Notes- ppts, B&W and Color PDF files
Audio Lectures	LO4	MP3/M4 Audio Files for listening
Forum view discussion	LO5	Welcome to ICT5001

The first column depicts how the system labels the "Action" the second column shows the author's way of cataloging the "Action" in the form of LO label or mapping. The last column contains information about the "Action." Total counts for the Top 5-LOs selected for this case study were manually done for each course. Using the "Find" and "Count" functions in Excel file the total number of instances of the 5-LOs was extracted and recorded. The details of the 5-LOs are shown in the Table 5. A glance at the data provided in Table 5 reveals that ICT-6 has maximum number of hits (course view) in comparison to others.

It is important to note that the logs contain huge number of entries and data collected through the *reports* and *activity logs* have been processed and analyzed using Microsoft Excel and SPSS, two main statistical tools often used.

Table 5: Top-5 LOs and Their Usage in 8 Courses

Courses	Course View	Video	Lecture Notes	Audio Lecture	Forum View Discussion
	LO1	LO2	LO3	LO4	LO5
ICT-1	859	135	103	72	65
ICT-2	1468	253	172	171	287
ICT-3	1433	452	72	0	616
ICT-4	623	6	20	0	77
ICT-5	854	22	365	0	111
ICT-6	1845	102	561	0	542
ICT-7	1400	82	186	2	276
ICT-8	474	26	24	63	72
Legend	Lowest Highest				

Information for Analysis

For the purposes of this case study this author uses an analogy to compare an eLearning instructor to a pilot flying an airplane. The pilot receives all the data from the sensors installed in the airplane at various locations. The indicators on the dashboard in the cockpit display all the data. The pilot is trained to interpret the indicators to take suitable actions. Similarly, an instructor teaching in a VLE should also be trained to do the same. He/she should carefully look into the data being provided by the system logs. He/she should learn to interpret the system data about usage of LOs or components provided in a courseware. his case study is a very limited attempt for using system logs to understand the usage of courseware components.

In the field of computer sciences reports and logs have been traditionally utilized to track anomalies within a system. Reports and logs are also extensively used in information security, computer forensic, Internet hacking and in increasing cybercrime scenarios. The causes of a harmful cyber attack, mishap or anomaly are extracted from the memory dumps and system logs. In such circumstances, logs are used as the sole instruments of evidence, not surveys or opinions of those affected or involved.

The data derived from the LMS activity logs give glimpses of weekly pattern of *views* and *posts* for all courses hosted on the LMS. In this respect, it was possible to evaluate the ways in which all participants (students, administrators and instructors) are using the LMS. For all practical purposes, only data about the students have been considered. Captured data for other participants is not included in this study. The *views* and *posts* data for all 8 classes graphed in Figure 6 and Figure 7 shows a very wide pattern of behaviors.

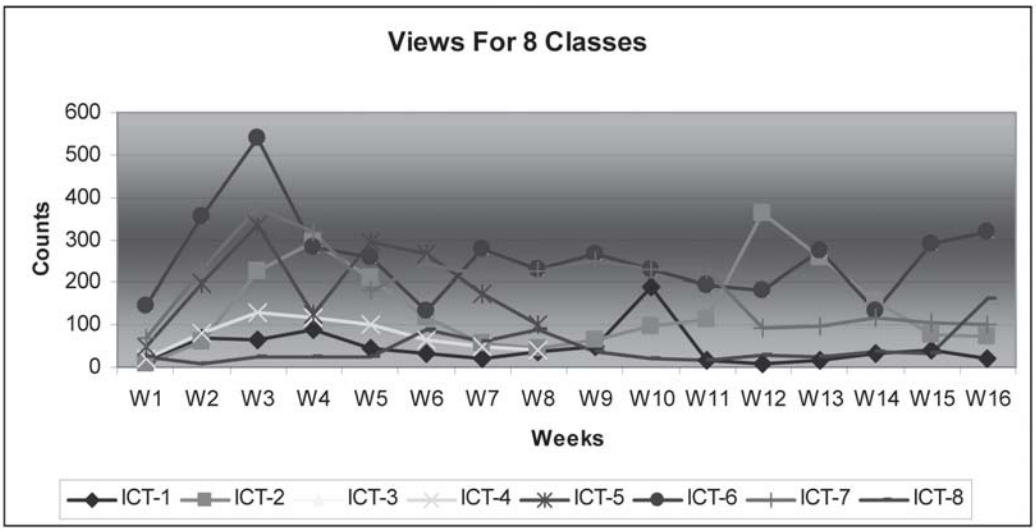

Figure 6: Views for All the 8 Courses

In most courses the *views* were maximum in the first 3 weeks of the semester and during the midterm and later at the end of the semester. In between there was tapering of *views* as well as *posts* activities.

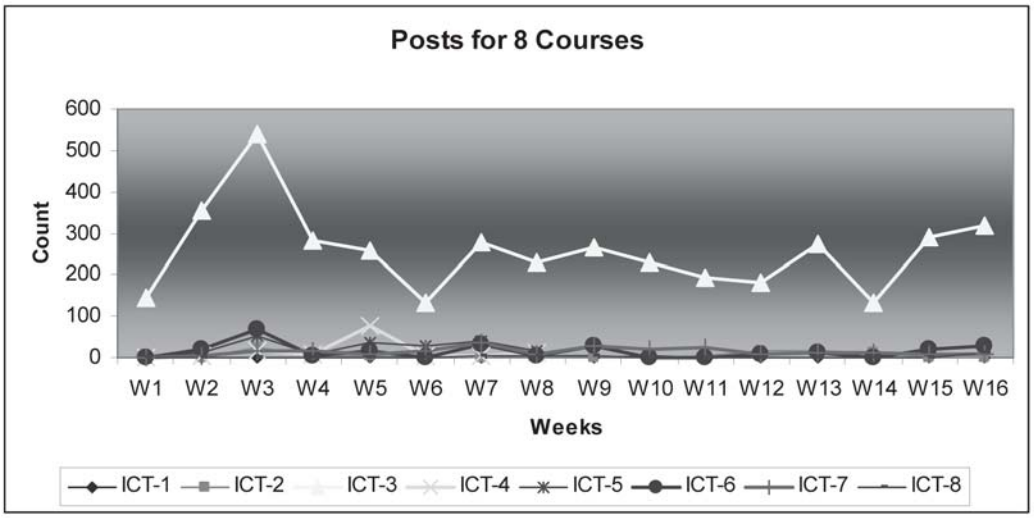

Figure 7: Posts for All the 8 Courses

On the basis of data analysis following conclusions can be drawn about this case study. These conclusions roughly maps to the research questions formulated for this case study and can be summarized as follows:

1. LMS tools such as *Reports* are critical to understanding various activities in a VLE.

2. Logs obtained from *Reports* are a sort of gold mine. The instructors can find nuggets of information very critical for understanding LOs or component usage in a courseware.

3. Analysis of data captured in system logs can be very useful in understanding the usability patterns of a particular LO or component in a VLE.

4. A critical analysis of data and its interpretation can lead to changing or modifying the LOs or components as well as overall design of an eLearning courseware.

The possibilities are endless as long as the instructor and the ICT team are open to the results obtained from quantitative analysis of system logs.

It is remarkable that even though only 5 LOs were selected for this study the results were convincingly clear that 4 out of 5 LOs or components selected for this case study were not used as expected. In particular, the key components such as "Study on-line" instructor's VDO lectures and audio lectures showed very low usage.

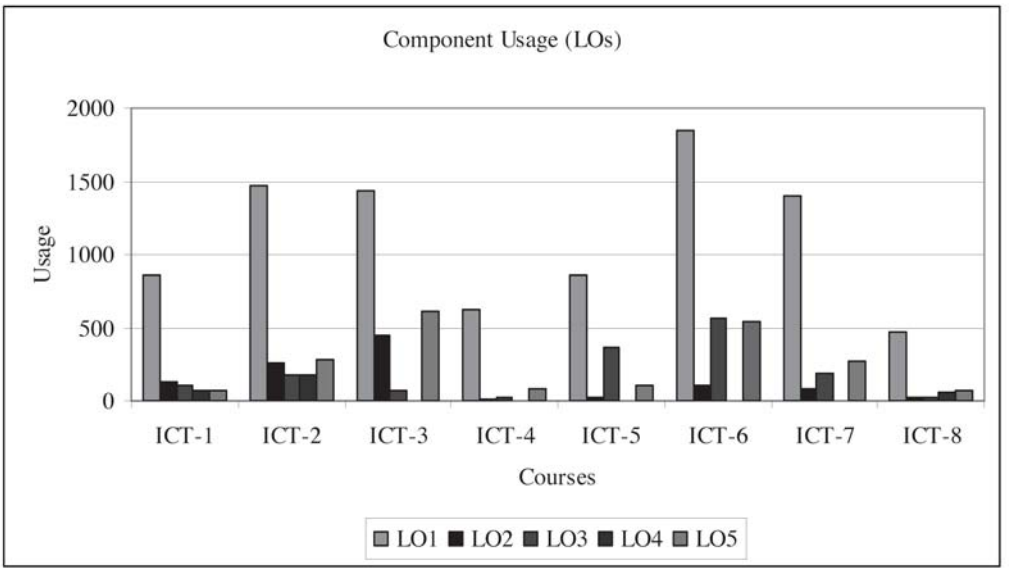

Figure 8: Usage of LOs or Components in All the 8 Courses

The audio lectures (MP3/MP4 podcast) are a very attractive component for the young digital learners. But it was not used as intended. Lows usage of these two critical LOs or components (VDO and audio files) is a clear indication of their poor quality. Or else what other reasons could be assigned for their lowest usage. Hence it is important to define the attributes of quality in a LO or a component created for eLearning courseware. Although it is not easy, it can be done as long as the attributes of quality of a courseware LOs or components are fully defined.

Implications for Universities and Students

Many private companies collect huge amount of data about usage of their products and services. Careful analysis of such data can lead to improvements in a product or a service. Just like private businesses, many universities have also started using this business principle for

producing and delivering a courseware. A courseware can be packaged as a "product or a service" and should be defined by all possible attributes of quality. And one key attribute of quality is "quantity." How many people are actually using a product or a service is one of the critical elements of quality? Such analysis done by the industry relies on huge amount of data collected over time. This work can extend into two possible areas. The first area is focused on data mining to explore association rules for various LOs or components and the second direction is about applying processes such as Six Sigma to reduce defects in a product or a service[8]. These two future directions derived from this case study are briefly discussed in the following sections.

Data Mining to Extract Useful Session Data

Data mining is extensively used for Knowledge Management in a commercial enterprise. Knowledge Discovery as proposed by Jiawei Han through data mining consists of following steps: collecting data, preprocessing data, applying the data mining algorithms and post processing[9]. Application of mining-association rule process in eLearning systems require huge amount of data[8]. After collecting relevant data a mining tool such as WEKA or any other product available in the market can be used. WEKA (Waikato Environment for Knowledge Analysis) is a popular suite of machine learning software written in Java, developed at the University of Waikato, New Zealand. It is capable of implementing several algorithms for extracting association rules. Mapping association rules require system logs to be used as a knowledge base. In an eLearning environment an example of an association would be that *"40% of students who used the "Study on-line"* (LO2) *also used the audio lectures* (LO4)*"* There are many possibilities to apply association rules in a learning process. A precise association about access to various LOs or components and their relationships for usability can be further explored for the purposes of improving a courseware. This kind of future work will require real time data mining tools and a subset of software modules that can be created by database experts and programmers to make an LMS more relevant for eLearning. Such solutions are beginning to appear in the private sector.

Application of Six-Sigma: A Quality Assurance (QA) Method

The second area for future research involves processes such as Six Sigma, a quality assurance philosophy used in manufacturing industry. One of the key elements of Six Sigma is the use of measurement and analysis of data for process improvement. In Six Sigma low usage of a product would be seen as something happening due to "defects." Quality assurance (QA) through Six Sigma requires assessment of all the attributes of a quality in an eLearning courseware production process. As an example, this sample study covers just 8 courses and only 5 LOs or components. Although limited, the under usage or defects indicates that the eLearning courseware development cycle could incorporate Six Sigma process. The first step in the courseware development process should start with measurement goals for quality in a courseware. Traditionally, this key step has been missing in the academic courseware development cycle. Six Sigma approach takes the form of projects conducted in 5 major phases generally recognized as Define–Measure–Analyze–Improve–Control (DMAIC).

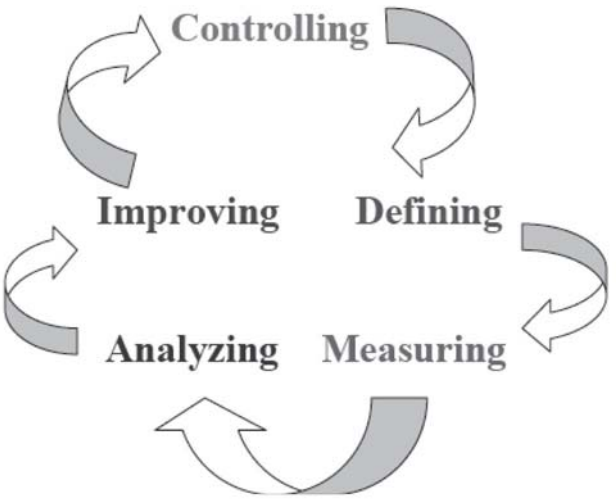

Figure 9: Six Sigma DMAIC Phases

After the "Define" phase of a project, key process characteristics are identified, studied and benchmarked through the "Measure" and "Analyze" phases. Figure 9 given above illustrates the basic steps of the Six Sigma process. This is followed by the "Improve" phase where a process is changed for a better or optimized performance. The last "Control" phase then ensures

that the resulting gains are sustained beyond the completion of the project. The use of statistical thinking is a common thread through the five phases, with measured data providing an indispensable proxy for realities and facts. Key steps of Six Sigma discussed above can be applied to eLearning courseware production process in the following sequence:

1) Define the attributes of quality in a courseware product and related services that are important to student's learning;
2) Explore why the courseware fails to deliver what student wants? This will require usage measurement and quantitative data;
3) Explore what can a university's courseware production process deliver?
4) Measure what student sees and feels when a finished courseware LO or components and related service varies from what was expected;
5) Create ways of ensuring consistent, predictable process to improve what students use for their learning, and
6) Improve a courseware and related services that can be produced to meet the student needs?

It is to be noted again that the Six Sigma process requires huge amount of data over a period of time to better detect the "defects" in the components to sustain improvement. And it can definitely be applied in a selected manner to eLearning courseware development process. When a courseware development process is wedded to Six Sigma or any other quality assurance techniques it can produce consistent predictable learning experiences based on quality. In other words, fewer the 'defects' in a courseware, lesser is the 'reworking' on components resulting in higher percentage of usage. There are fewer hassles for the students and they will able to use the courseware components sooner and to greater effect. It should also prioritize the indicators and identify the ones that will be most useful for refining the process. Through ongoing work this author is exploring application of Six Sigma philosophy for improving eLearning courseware components.

eLearning requires more change management in educational institutions than other places–good content is always given as a reason, but using technology for enhancing learning is more about quality of courseware components and their efficient usage. But the challenge these days is "who defines quality in educational courseware? Courseware is not seen as

a product or a service– that's part of the problem. This is one reason why academia is slow in adopting new technologies for enhancing quality of learning. Proper usage of digital content can make on-line learning more relevant to the average user connected to the Internet. A general recommendation would be to refining on-line content for eLearning, starting with a very efficient content development and delivery process using a select set of Web 2.0 technologies. Usage of LMS tools such as reports is critical in creating quality content in an on-line courseware. Qualities of courseware components are not only critical for the success of on-line learning but are also the hallmark of a good eLearning or eTraining programs. As a part of the academia, not the industry, all of us need to look at this process from "inside-out." After more than a century of existence, a courseware used for teaching and learning is not seen as a "product or a service." It is about time that the attributes of quality of a product or a service used in the private sector are also applied to a courseware.

Endnotes

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