Effective Implementation of e-Learning in Initial Learning Program: A Case Study

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Abstract - Case studies are effective in dealing with factors like creativity, innovation and context. This case study attempts to highlight the outcomes of introducing the concept of e-learning into teaching technical topics like Dotnet, Java, Mainframe and C++ of the Initial Learning Program at Tata Consultancy Services Limited in 2012-2013. These findings will be of interest to any organization that plans to implement e-learning methodologies to help its employees learn and remember the initial lessons of software development and the various programming languages with limited faculty support. The outcome of this case study indicates a stable and prominent increase in the use of e-learning strategies in consort with the traditional methods of training.

Keywords: e-learning, strategy

1 Introduction

As the world gets more and more dependent on information technology systems, the leading organizations are beginning to realize the potential of information and communication technology (ICT) systems in developing the competencies of their employees. The knowledge of appropriate processes, effective strategies and procedures is essential to improvise the workforce capability through the implementation of e-learning techniques.

1.1 Objective of the case study

The aim of this case study (Effective Implementation of e-Learning in Initial Learning Program) is to establish the factors that affect e-learning in similar organizations and how best to leverage them and get the best results from e-learning. This paper is a research review which would increase the awareness in industry of the development, delivery and impact of cost-effective and instructionally sound e-learning.

2 Background

Tata Consultancy Services Limited (TCS) recruits thousands of engineering graduates every year from Computer Science and non-Computer Science engineering streams through campus recruitment programs from colleges all over India. These fresh recruits join in batches to one of the TCS ILP centers for their initial learning program. They are allocated to a technical stream like Java, Dotnet, C++, Mainframe, EIS, BIPM or Testing. During the initial learning program (ILP), these graduates are provided 60-day rigorous training on the key programming skills and concepts along with courses on Business Skills and professional etiquette.

2.1 The Challenges

Conducting the Initial Learning Program (ILP) entirely through traditional methods of teaching posed some challenges to the training managers. The challenges faced are as follows:

2.1.1 Number of learners

As many as 21,822 graduates joined the eight ILP centers in batches in 2011-2012, and the case has been similar for previous years as well. Among them, 50.4% were from Computer Science stream and 49.6% from non-Computer Science stream. 41.5% of them were allocated to Java, 17.7% to Mainframe, 14.4% to Dotnet, 13.5% to C++, 7.6% to BIPM and 5.2% to testing. There were around 400 faculties catering to them, thus resulting in a high student-faculty ratio. As a result, the faculties find it difficult to give individual attention to each student.

2.1.2 Fairness of faculties

Each technical and non-technical stream had faculties who were popular among the learners and had taken name as being the “best” because of the learning theories and teaching style they chose in teaching. It was not practical to engage them for every joining batch, and hence, the fairness and consistency in teaching could not be achieved.
2.1.3 Utilization of resources

The recruits included students from all engineering streams. So, the curriculum included even basic courses on computers and programming. The Computer Science students needed such sessions as a refresher course too. The faculties felt that if the sessions on basic programming topics were taken off their shoulders, they could save a lot of their valuable time and utilize it better in assisting the students with their lab sessions that certainly call for individual attention.

2.1.4 Learner Behavior

Age and behaviour of the learners are interdependent. Age is also an important characteristic that decides the effectiveness of learning. The faculties observed that young learners are more receptive to information from sources other than traditional classroom sessions. They are tech savvy and take interest in innovative methods of learning. They prefer learning through practice than theory sessions. The faculties could make use of these aspects of young learners while designing learning videos for them. The use of learning videos and simulations to teach concepts could get the learners to think creatively and utilize their talents in a better way.

2.2 Approach to e-learning

In early 2012, the Corporate ILP team initiated the processes to create a series of video tutorials to teach the basic-level technical modules. The aim was to address the challenges in the existing system and improve the quality of learning and teaching. This could also seek solutions to problems associated with faculty crunches and logistics.

2.3 The project

A team of faculties from different technical streams was chosen to be involved in the project. They were briefed about the video creation project and their views on it were sought. After careful consideration, it was decided that e-learning can never replace traditional classrooms completely, but, can improve the quality of learning. It could be used in conjunction with traditional classroom sessions. The first step was to introduce e-learning into the organization’s Initial Learning Program (ILP) by using video tutorials to teach the basic concepts in core technical courses.

3 Video Tutorial Creation

After deciding on the authoring tools and the platform for video hosting, the first step was to identify the topics in curriculum that could be moved as video topics. Since faculty-student interaction would be minimal in e-learning, it was decided to make videos to address the Level 1 or basic topics which are ideal for self-learning and do not require faculty intervention.

This was followed by train-the-trainer programs for the chosen faculties on the authoring and recording tools. The next step was to document the guidelines for video creation and to define the project activities systematically. A check-list was also put together and the faculties could use it to ensure consistency across streams in the application of learning theories and teaching styles.

3.1 Instructional Design Analysis

The instructional designer team analysed the following factors to design the course modules in each stream. The following are the observations of the audience and task analysis activity of the project:

3.1.1 Audience

Graduates (mostly of age-group 22-24) with diverse cultural background with varying levels of subject knowledge (The group consisted of both CS and non-CS graduates). Most of the audience population was well-versed in using computers.

3.1.2 Course goals

Each course is intended to improve the technical competencies of the learners in specific technical streams. So, the learners should be able to grasp the context of a problem and write code to address the basic programming requirements.

3.1.3 Details of learning environment

Each video will have appropriate graphics/images; on-screen text and audio integrated into it and is intended to be hosted in a video server. The modules will also be integrated with appropriate Check Your Understanding questions and assessments.

3.1.4 Number of videos

There were around 50 videos created on each topic. These videos addressed the Level 1 concepts in every technical stream. Some of these videos could be re-used as well, to address the same concepts across technical streams.

3.1.5 Video duration

Each video will be of 12 to 15 minutes duration.

3.1.6 Learning Objectives

The learning objectives are specific for each video.
3.1.7 Interactivity

The instructional designers tried adding scenarios into each video. These scenarios allow learners to select their options. Some of these were branching scenarios where the learners can choose a path to proceed based on their responses to specific problems.

3.2 Learning Pedagogies

E-Learning was used as a thread that deals with understanding the learning needs and ways of learning better with the best use of technology, and then designing the content to meet these needs. The courses were designed with the view that technology is not about giving the content on attractive templates and adding complex animations to it; it is not about introducing multiple “clicks” to make it user-interactive. It is about designing appropriate learning objects to teach different concepts making the best use of available technology. Each learning object carried the essence of classroom training in every possible way.

The term “pedagogy” refers to the activities that could be used to instruct a particular skill or the activities that impart learning. The faculties were as much involved in deciding on the right pedagogy as the instructional designers. These activities were designed based on the learning outcome that they should bring forth in terms of enhancing the learner’s knowledge levels and motivating them to learn further. The faculties put forth a set of activities based on the learners’ experience and the way they learn. Based on this preferred approach, the instructional designers helped to design each course, and this helped to make each course learner-friendly.

3.2.1 Gagne’s Nine Events of Instruction

In addition to the training on new tools, the faculties were provided appropriate training on the instructional strategies and methods that foster effective learning. As a result, they have applied the nine events of instruction proposed by Robert Gagne in the development of each tutorial.

3.2.2 Simulations

Full-motion recording of the screen and screen captures are used in software demos. For instance, the topic on CRUD in the Application Understanding module in Java uses simulations to demonstrate create, read, update and delete operations in a web-based application.

3.2.3 Podcasts

A number of podcasts were recorded by experts in the particular topics and then included as a part of the video.
3.2.4 Resources

Effective learning was ensured by making the best use of teaching resources available to the faculties. To teach the complex topics, they used tablet computers and interactive whiteboards. The screen capture is that of a C++ topic, where a tablet computer is used to teach the concept of pointers; this is also an example of how faculties have obtained a balance between e-learning and the traditional mode of training, while making use of the best options available in technology.

3.2.5 Examples and non-examples

The basic programming concepts were best explained using appropriate examples and non-examples. For instance, one of the tutorials in the User Interface module in the Java stream points out that the nuclear disaster at the Three Mile Island Nuclear Power Plant was as a result of its highly complex and non-user friendly interface. The topic then goes on to discuss how user interface is a strong element in the design of efficient systems.

3.3 Role of technology

3.3.1 Authoring tool

Adobe Captivate 6 was the authoring tool chosen to capture the videos. The videos were published with the following technical specifications: Resolution: 800*600, Maximum Bitrate: 2 Mbps, Quality: Youtube Widescreen SD, Format: mp4.

3.3.2 Learning Platform

These videos were hosted in a Learning Management Environment built on Sakai server. This made the tutorials easily available to the learners and they could access it from the labs and classrooms.
3.3.3  Assessments and check your understandings

Assessments and Check Your Understanding questions are another feature of the learning modules.

3.3.4  Discussion Forums

Another feature of the learning platform is the discussion forums that it offers. The learners use this to provide feedback to the faculties as well as to discuss concepts with other learners.

3.4  Advantages of e-learning

3.4.1  Better student participation

The faculties succeeded in identifying the right kind of activities and teaching styles for most of the course modules, and that is the key to success in such projects.

For instance, most of the programming exercises followed “Show Me- Try Me” strategy. For example, simulations were used to explain a concept and then, the learner was provided with practice exercises. Some of these activities posed interesting challenges to the learners, and they were instilled to work on the programming code and then post their findings in the forum. Faculties provided prompt feedback. The student enthusiasm and participation in such activities has shown a steady improvement when compared to that in classroom.

3.4.2  Improved Learning Retention

Viewing the video tutorials over and over again has helped the non-CS students to get a grasp on the basic topics. The recruits from the CS background could use these videos as refresher lessons to brush up on the concepts they have forgotten from their college classes. The faculties could use simulations in between their theory sessions and this also helped to foster better learning and retention. Eg: Videos on Mainframe topics

3.4.3  Discussion Forums

The lack of class/group discussions initially posed a challenge to the faculties. The discussion forums included in the learning environment partially helped to solve this challenge. Soon, the learners started to make good use of these forums to discuss the technical aspects of the course as well as
to share reference websites and to provide solutions to issues they face while working out the programs or codes. The faculties view this as improvement to the traditional classrooms, because, in traditional classrooms, the learners have always been discreet to discuss their views on a problem openly. But in the new scenario, the learners have started making better use of reference sites so as to be able to participate actively in discussions.

3.5 Challenges/ difficulties in e-learning

The introduction of video tutorials has successfully solved most of the challenges that existed in the system. However, the faculties encountered a few difficulties in their effort to create the video tutorials.

3.5.1 Changes to learning styles

Faculties had to adapt to new styles of teaching and make changes to the learning pedagogies that they followed to make better e-learning experience.

3.5.2 Challenges in conceptualization

The faculties encountered challenges with conceptualization of some of the videos and in creating them. The major difficulty was to keep the learners engaged without the luxury of face-to-face interaction or emotional connect with them.

3.5.3 Difficulties in getting feedback

Similarly, the faculties found it difficult to gauge the understanding of students, in spite of building in CYUs between modules. The feedback cycles also took longer than that in traditional training.

3.6 Results

3.6.1 Learner Feedback

The Corporate ILP team has collected feedback from 368 learners from the Java stream for whom video tutorials were used as primary mode of training. The tutorials were on the Information Management, Application Understanding, User Interface and Problem Solving modules. The feedback collected was on the effectiveness of video tutorials and their satisfaction levels.

25.54% of the learners have strongly agreed that the content presented in the video tutorials was clear and sufficient for them to understand the concept. 70.92% of the learners have agreed to it, while 3.5% have disagreed to it. These results indicate the interest of learners in taking up video tutorials.

3.6.2 Learning effectiveness

The effectiveness of video training can be measured by comparing the performance of a batch (Batch A) that had video tutorials as the primary mode of training to the performance of trainees in another batch (Batch B) that followed the traditional classroom method of training. The strength of Batch A and Batch B were 213 and 230 respectively. The assessment tests were taken as criteria to decide the learners’ performances in both batches. There were no cases of training extension in Batch A (all of the participants scored the required average in the test), while 7 learners had to be extended in Batch B. This test result can be considered as a clear indicator of the effectiveness of video tutorial sessions.

4 Foreword

The following are the next steps planned in this direction:

4.1 For pre-ILP learners

Although it may not be possible to replace traditional classroom training completely with e-learning, blended learning has helped a lot to improve the quality of instruction and in highlighting independent learning. The advantages of video tutorials and their reception among learners have opened up more possibilities for these videos. The senior management has started to look into the possibility of using video tutorials on basic programming concepts to train the pre-ILP students; the students who have been recruited but yet to join TCS.

4.2 For post-ILP learners

Similarly, the possibility of using video tutorials as refresher courses for post-ILP batches (learners who have completed their Initial Learning Program but yet to be allocated to projects) is huge.

4.3 Hosting videos in TCS video channel

The hosting of ILP videos in the TCS video channel is the next step in technological advancement in this direction.

5 Conclusion

The introduction of video tutorials into the initial learning program at TCS has received mixed comments from learners and faculties. Most of the comments have held blended learning as learner-friendly mode of training. However, none of them has a completely negative comment to share about the project.
The learning group is more or less tech savvy and they readily accept blended learning as the future direction in learning. This mode of learning more or less meets their expectations in terms of how they should learn, the learning environments that best meet their training requirements, and how to leverage infrastructure to their best advantage.

When made use of in moderation and by interspersing them with lectures, video tutorials can improve the learner participation, retention and engagement. With the effective use of technology, it can be used as a powerful tool to be used in support of lectures.

6 References
