

FLIPPED CLASSROOM BASED FRAMEWORK TO REPURPOSE ONLINE COLLABORATION TOOL AS LEARNING MANAGEMENT SYSTEM FOR ONLINE EDUCATION

Dr. Sachin A. Kadam

Professor of Computer Applications, Bharati Vidyapeeth (Deemed to be University), Pune (India)

Email: sachin.a.kadam@bharativedyapeeth.edu

ORCID: <https://orcid.org/0000-0001-9330-3526>

ABSTRACT

Online Education initiatives of an academic institution are supported by Learning Management System (LMS) software. The services offered by a LMS are in synchronization with online education requirements as it is specifically designed for the same. Learning pedagogies are also taken into consideration by a LMS. As compared to LMS, an Online Collaboration Tool (OCT) is offered as a generic online service with focus on collaboration among its users. This research article suggests that an OCT may provide a feasible alternative to LMS for an academic institution to support online education. It explores this possibility by repurposing OCT as LMS using Design and Creation research methodology. It prescribes OCT2LMS framework based upon Flipped Classroom pedagogy for the same. It also validates practicality of OCT2LMS framework through feasibility and security analysis.

Keywords: Online Education, Learning Management System (LMS), Online Collaboration Tool (OCT), Blended Learning Pedagogy, Flipped Classroom Pedagogy

INTRODUCTION

An academic institution's online education initiative needs to be supported by a dedicated online software application generally known as Learning Management System (LMS) (Ellis, 2009). The dedicated nature of a LMS confirms that the services it offers are in synchronization with expectations from online education. In contrast to a LMS an Online Collaboration Tool (OCT) is a generic software application designed to support collaboration among its users. The purpose of a collaboration tool is to support a group of two or more individuals to accomplish a common goal or objective (Lomas et al., 2008) (Nunamaker et al., 2014) (Fitcher, 2005).

SIGNIFICANCE OF RESEARCH

The dedicated nature of a LMS necessitates an academic institution to take full responsibility from setup to adoption by its stakeholders. As compared to LMS, an OCT is generic software. Its acceptance is driven by financial and technology free ubiquitous access. The high acceptance level of an OCT over a LMS ensures its familiarity and comfort among stakeholders involved in an academic institution. The financial-free model of OCT makes it an economically feasible alternative to LMS. Also it frees an academic institution from technological issues as it is generally offered as service by third-parties, as compared to a LMS where an academic institution is required to setup and manage it, along with management of stakeholder credentials.

This scenario invites a possibility to repurpose an OCT as a LMS as it may provide a user-friendly, economically feasible and technically feasible alternative to LMS.

RESEARCH PROBLEM

The introductory discussion can be summarized into a problem statement as follows;

Create a generic (i.e. technology independent) framework to repurpose an Online Collaboration Tool (OCT) as a Learning Management System (LMS).

One also needs to consider teaching pedagogies as a LMS is required to supplement teaching-learning process. Therefore the stated problem statement can be revised as;

Problem Statement

Create a generic (i.e. technology independent) framework to repurpose an Online Collaboration Tool (OCT) as a Learning Management System (LMS) in consideration with an appropriate teaching pedagogy.

RESEARCH METHODOLOGY

This research proposes to design a new framework. As a new framework is an artifact, Design and Creation research methodology is suitable for this research (Oates, 2005).

Design and Creation Research Methodology

This methodology involves six process steps to help a researcher to develop an artifact by exploring functional capabilities of existing systems (Ahmed and Sundaram, 2011);

1. Awareness of the Problem: to understand need for new artifact
2. Suggestions: to explore and use functional capabilities of existing systems
3. Development: to match requirements from first step and suggestions from second step to create a new artifact
4. Evaluation: to access the feasibility of new artifact with respect to requirements from first step
5. Conclusion: to summarize contribution of the research

Mapping of Article Sections with Steps in Design and Creation Research Methodology

The research contents of this article and research outputs at various stages can roughly be mapped with mentioned process steps as follows:

- Step 1: Introduction, Significance of Research, and Research Problem (Output: Problem Statement)
- Step 2: Comparison of Services offered by LMS and OCT, and Selection of Appropriate Teaching-Learning Pedagogy (Output: Proposal to design OCT2LMS framework)
- Step 3: Overview of OCT2LMS Framework (Output: OCT2LMS Framework)
- Step 4: Analysis of OCT2LMS Framework (Output: Feasibility and Security Analysis)
- Step 5: Findings and Interpretations, and Conclusion (Output: Conclusive Summary)

COMPARISON OF SERVICES OFFERED BY LMS AND OCT

This research proposes to repurpose OCT to LMS. The term *repurpose* is defined as *to change something slightly in order to make it suitable for a new purpose* (Oxford, 2020). To identify the necessary changes required for this repurpose, the researcher conducted a detailed comparative analysis between services offered by a LMS and services offered by an OCT. Table 1 summarizes this service-gap analysis.

Table 1: Comparison between LMS and OCT

	LMS	OCT
Organization Model (System Management)	Centralized	De-centralized
Participation Model (User Management)	Selective participation	Open to all
Access Model (Access Management)	Hierarchical model with centralized role specific access control	Lateral model where all users are at same level and access permissions for resources are managed by individual resource owners

An academic institution cannot change the Organization Models as they are intrinsic part of their implementation. Therefore it can only control the participation and access models of OCT as per the requirements of LMS for successful repurpose. A study of these models with respect to expected services reveals 14 guidelines for an academic institution to repurpose an OCT to a LMS.

GUIDELINES FOR AN ACADEMIC INSTITUTION TO REPURPOSE OCT TO LMS

Guidelines to Setup a Virtual Classroom

- i. Centralized control over user management (create/remove) to validate institutional users (through a repository stored in a text file, spreadsheet or database)
- ii. Centralized control over group management (create/remove) to create virtual classrooms
- iii. Centralized control over group memberships (add/delete) to map users to appropriate classrooms
- iv. Centralized control to assign roles in respective classrooms (Student, Teacher, Class-Coordinator, Head of Department, Head of Institution and Technical Administrator)

This setup needs to be done only once for a class/programme. The same then can be reused for that class/programme for every academic session.

Manage (Add/Delete) Classroom Members

- i. Centralized control over user participation
- ii. Centralized control over access to resources

As students and teachers in a class/programme will change per academic session, this setup needs to be done once for a class/programme at the start of an academic session.

Upload Notices on Virtual Noticeboard

- i. Virtual Noticeboard needs to be reset at the start of every academic session.
- ii. Then onwards Class Coordinator needs to manage it as and when required throughout the academic session.

This is a routine activity which needs to be conducted on frequent basis as per the requirement (e.g. once in a day).

Access Notices from Virtual Noticeboard

- i. Virtual Noticeboard provides a Push model to communicate the information to stakeholders involved in a class/programme (Martin, 1994)
- ii. Stakeholders (Students and Teachers) are required to visit the Virtual Noticeboard at-least once in a day.

This is a routine activity which needs to be conducted on frequent basis as per the requirement (e.g. once in a day).

Manage Time-Table of Academic Activities

- i. Generally OCTs provide inbuilt Calendar feature. It can be used to support this activity, which follows Push model (Martin, 1994).
- ii. Researcher suggests Virtual Noticeboard approach to avoid confusions due to multiple Push notifications.

This activity's frequency will be seldom as per the changes in Time-Tables.

Access Time-Table of Academic Activities

- i. Time-Table through a Virtual Noticeboard provides follows Push model.
- ii. Stakeholders (Students and Teachers) are required to visit the Virtual Noticeboard at-least once in a day to check the Time-Table.

This is a routine activity which needs to be conducted on frequent basis as per the requirement (e.g. at the start and end of every day).

Guidelines to Conduct an Online Session

- i. Teacher should initiate an online session as per the Time-Table shared through Virtual Noticeboard.
- ii. Students will join the session on their own as they are already aware about it through the Time-Table.

Guidelines to Conduct Online Attendance

- i. An OCT generally provides features to log participant details. These can be used for attendance.
- ii. Generally OCTs also support third-party plugins/modules for this purpose.
- iii. Screenshot of a conversation may also provide proof of attendance.

Researcher is of the opinion that a teacher should not give undue importance to this technical detail as almost all attendance systems are based upon a trust factor between teacher and students (except biometric attendance).

Guidelines to Upload and Access Session Specific and Supplementary Study Resources

- i. Class Coordinator should assign specific placeholders to respective subject/course teachers.
- ii. Teachers can then upload study resources using their credentials.
- iii. The uploaded resources can be accessed by Students using their credentials.

The Specific Study Resources may include resources prepared by the teacher (e.g. presentation, notes etc.) whereas Supplementary Study Resources may include resources readily available on the Internet (e.g. websites, online videos etc.).

Guidelines to Conduct Online Test/Quiz

- i. A Teacher may use one of the various online services available to create an Online Test/Quiz.
- ii. Its corresponding Link/URI (Universal Resource Identifier) then should be made available through placeholder in OCT.
- iii. Students then can attempt the Test/Quiz by visiting the link/URI.
- iv. Assessment and result communication of objective Test/Quiz can be automated, whereas that of descriptive Test/Quiz may need to be done asynchronously by teacher.

This way OCT acts as an aggregator and provides a service independent approach towards Test/Quiz conduction.

Guidelines to Conduct Online Assignment

- i. A Teacher may use one of the various online services available to create an Online Forms accepting a File Upload.
- ii. Its corresponding Link/URI (Universal Resource Identifier) then should be made available through placeholder in OCT.
- iii. Students then can submit an assignment through file upload.
- iv. Uploaded files may be downloaded as a submission proof and then accessed by the Teacher.
- v. Compiled result can be communicated to students through Virtual Noticeboard.

Guidelines to Conduct Online Feedback

- i. A Class Coordinator may create an Online Feedback Form using an available service.
- ii. OCT again should act as a link aggregator and provide access to student.
- iii. Feedback Analysis Report then can be auto-generated through opted online service.

Guidelines to Address Student Queries in Online Mode

This activity can be performed through Synchronous and/or Asynchronous modes. Synchronous mode will allow real-time responses to queries, whereas Asynchronous mode facilitates more flexible approach allowing teachers to address queries whenever they are available.

- i. Synchronous Mode: OCT generally provides a Chat feature which can be used to address queries from Students.
- ii. Asynchronous Mode: Institute may opt for e-Mail mechanism for the same to maintain discreteness.

Apart from query solving by a Teacher, the Forum feature provided by an OCT can be used for peer-to-peer query solving (preferably in Asynchronous mode).

Guidelines to Monitor Course, Class, Programme and Institute Level Activities

- i. OCTs provide mechanism to log user activities.
- ii. Institute should provide selective access to these logs as per stakeholder level.

Generally these logs can be exported to a spreadsheet for further analysis.

SELECTION OF APPROPRIATE TEACHING-LEARNING PEDAGOGY

The application of OCT to support online ducation has to be based on an appropriate teaching-learning pedagogy. Pedagogy is defined as *the study of teaching methods* (Oxford, 2020). The traditional classroom teaching pedagogy needs to be updated to encompass supportive use of technology. This can be achieved through Blended Learning pedagogy.

Pedagogies for Technology Enhanced Teaching-Learning Environment

Blended Learning is a way of studying a subject that combines classroom teaching with the use of different technologies, including learning over the Internet. It represents a way of education which encourages learning using electronic media along with conventional face-to-face classroom teaching. There are different models available to represent the Blended Learning approach namely; Rotation (Station Rotation, Lab Rotation, Flipped Classroom and Individual Rotation), Flex, A La Carte and Enriched Virtual (Horn and Staker, 2011).

Recommendations for e-Resource Design and Duration

The recommended guidelines state that an online academic programme “may be done in a manner that a substantial part that at least 75% of the total duration of each production should use innovative learning techniques viz. case-studies, scenarios, animation, analogies, individual or group activities, concept-mapping, in-text learning quizzes, interactive exercises within learning modules, discussion forum, multi-media techniques, innovative graphics, live experiments, demonstrations, role-plays, field documentaries etc.” (Government of India, 2017)

One also needs to consider studies related to the attention span of users on online services. The trend is biased towards smaller e-resource units. A survey of various online education platforms also reveals small duration video contents (e.g. 10 minute clips) (Coursera, 2020), (edX, 2020), (SWAYAM, 2020)

Flipped Classroom Pedagogy to Support Repurpose of OCT to LMS

The mapping of above recommendations with different Blended Learning models suggests Flipped Classroom pedagogy suitable for the problem under consideration. Flipped Classroom recommends basic delivery of content and instruction through online medium, and need for teacher interaction to focus on problem solving (Horn and Staker, 2011). Researcher recommends a following variation of this approach to allow repurpose of OCT to LMS:

- Provide session specific e-resources to students prior to the session for self-study purpose.
- Conduct online session focusing on application and problem solving skills.

- Conduct a post-session test to assess the understanding during session.
- Conduct an online assignment at the end of a syllabus unit.

OCT2LMS FRAMEWORK TO REPURPOSE OCT TO LMS

Researcher has synthesized the understanding of *Comparison of Services offered by LMS and OCT, Guidelines for an Academic Institution to repurpose OCT to LMS* and *Selection of Appropriate Teaching-Learning Pedagogy* sections into a generic (i.e. technology independent) framework, henceforth referred as OCT2LMS framework. This framework provides all LMS specific services through OCT by managing its Participation and Access Models. It uses Flipped Classroom Pedagogy as a template to sequence the services.

The framework consists of following entities:

- Stakeholders: Technical Administrator (A), Class-Coordinator (C), Teacher (T), Student (S), Head of Department (H) and Head of Institution (I)
- Activities: All LMS specific services
- Activity Sequence: Flipped Classroom Pedagogy
- Implementation Mechanism: Participation and Access Control Models of OCT

Technical Administrator, Class Coordinator and Teacher roles form the fundamental blocks of this framework. Technical Administrator should create appropriate groups to represent virtual classrooms and provide their management permissions to respective Class-Coordinators. A Class-Coordinator then should create dedicated course/teacher specific placeholders. These placeholders will act as aggregators for various online links provided by respective teacher. A Teacher should have Edit permission whereas Students should have Access permission to these placeholders. Teacher may use online services from same OCT or from different platforms and aggregate corresponding links into their placeholders. Students can access resources provided by teacher through uploaded links through their OCT account. Head of Department can access all placeholders of a Virtual Classrooms belonging to their department, whereas Head of Institution can access for all departments along with logs. Figure 1 illustrates this discussion along with activity sequence.

Vertical lanes in Figure 1 belong to respective stakeholders such as Technical Administrator (A), Class-Coordinator (C), Teacher (T), Student (S), Head of Department (H) and Head of Institution (I); and activity numbers specify their sequence (same numbers denoting parallel activities).

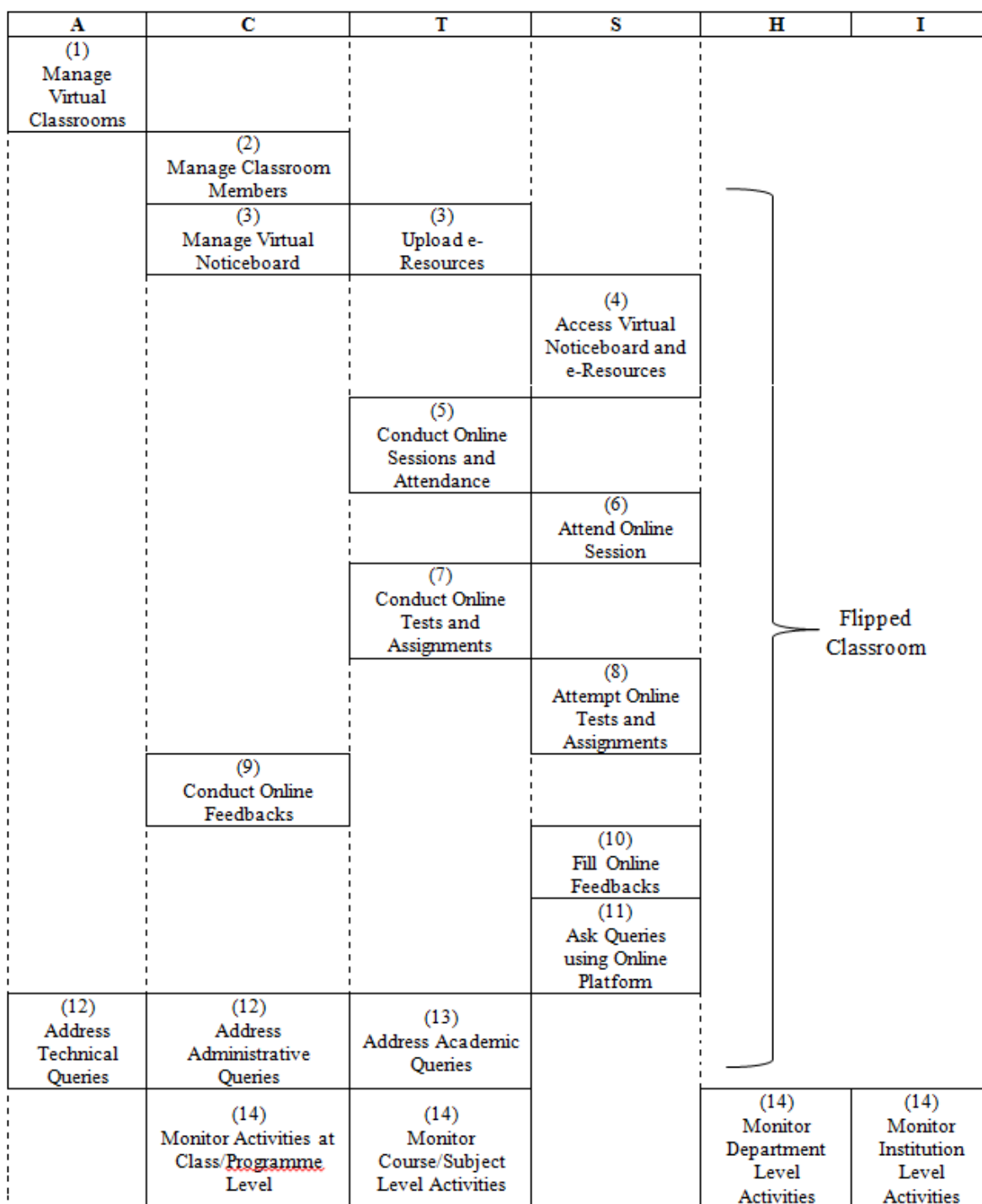


Figure 1: OCT2LMS Framework

ANALYSIS OF OCT2LMS FRAMEWORK

Feasibility Analysis

A feasibility analysis assesses the practicality of proposed artifact (Justis and Kreigsmann, 1979). This analysis for OCT2LMS framework is summarized as follows:

- Technical Feasibility: Academic institutions may not require any technical expertise to implement this framework as OCT platforms are offered as an online service by third-party providers. This makes it technical feasible.

- Legal Feasibility: The de-centralized Organization Model and open access Participation Model of an OCT necessitates stringent content-control measures by academic institutions. Lack of this may pose legal challenges with respect to Cyber Laws (Government of India, 2008)
- Operational Feasibility: As discussed in Technical Feasibility, an OCT approximates software outsourcing approach with respect to involved academic institution. This makes it operationally feasible.
- Time Feasibility: Repurposing of existing OCT platform ensures immediate availability of required services, making it Time Feasible.
- Resource Feasibility: Only Internet access requirement makes this framework feasible from resource perspective.
- Economic Feasibility: Generally an OCT is offered as a financial-free service. But this component is subject to specific requirements of an institute and corresponding Service Level Agreement (SLA) with OCT provider.

Security Analysis

As the proposed framework is based upon existing OCT, all possible security vulnerabilities and threats with respect to an OCT are implicitly applicable to proposed framework. Inherent de-centralized nature of Organization Model and open-access nature of Participation Model of OCT makes it sensitive to content type. This enforces a continuous audit of authentic information provided through this framework.

FINDINGS AND INTERPRETATIONS

- OCT2LMS framework allows an OCT to offer all expected services from a LMS. This ensures its successful repurpose as LMS.
- This framework has strong support from education pedagogy as it maps and sequences all offered services based on Flipped Classroom pedagogy.
- Analysis of OCT2LMS framework suggested that it is feasible from Technical, Operational, Time, Resource and Economic perspective. Therefore it provides a viable alternative to support online education initiatives.
- Analysis of Legal Feasibility revealed a need for stringent content-control measures to face challenges with respect to Cyber Laws. This was supplemented by findings from security analysis suggesting a requirement of continuous content audit to ensure its authenticity.

CONCLUSION

This research explored a possibility to repurpose OCT as LMS. Design and Creation research methodology was selected for this research. This approach resulted in OCT2LMS framework artifact considering the services expected from a LMS and those offered by an OCT. Organization, Participation and Access Models were used as a basis for service mapping. Flipped Classroom pedagogy was proposed to design the sequence of mapped service set of OCT. Feasibility analysis was performed to ensure practicality of this framework. The framework was found to be feasible in technical, operational, time, resource and economic aspects. Legal aspect was identified as a concern from content authentication perspective. Security analysis of the framework also revealed a need for periodic content audit. This necessitates due diligence from an academic institution for successful adoption the proposed framework.

REFERENCES

- Ahmed, M.D. and Sundaram, D. (2011). *Design Science Research Methodology: An Artefact-Centric Creation and Evaluation Approach*. ACIS 2011 Proceedings
- Coursera. (accessed on July 3, 2020). <https://www.coursera.org>
- edX. (accessed on July 3, 2020). <https://www.edx.org>
- Ellis, R.K. (2009). *Field Guide to Learning Management*. ASTD Learning Circuits
- Fichter, D. (2005). *The Many Forms of E-Collaboration: Blogs, Wikis, Portals, Groupware, Discussion Boards, and Instant Messaging*. Northern Lights Internet Solutions. pp. 48-50
- Government of India - Ministry of Human Resource Development - Department of Higher Education. (2017). *Guidelines for Developing Online Courses for SWAYAM*
- Government of India - Ministry of Law - Justice and Company Affairs - Legislative Department. (2008). *The Information Technology ACT, 2008*
- Horn, M.B. and Staker, H. (2011). *The Rise of K-12 Blended Learning*. Innosight Institute
- Justis, R.T. and Kreigsmann, B. (1979). *The feasibility study as a tool for venture analysis*, Business Journal of Small Business Management. pp. 35-42
- Lomas C., Burke M. and Page, C.L. (2008). *Collaboration Tools*. EDUCAUSE Learning Initiative
- Martin, M.J.C. (1994). *Managing Innovation and Entrepreneurship in Technology-based Firms*. Wiley-IEEE. pp. 44

- Nunamaker Jr, J.F., O'Briggs, R. and Romano Jr, N.C.R. (2014). *Collaboration Systems: Concept, Value and Use*. New York: Routledge. pp. 55-56
- Oates, B.J. (2005). *Researching Information Systems and Computing*. SAGE Publications
- Oxford Learner's Dictionaries. (accessed on July 3, 2020). <https://www.oxfordlearnersdictionaries.com>
- SWAYAM. (accessed on July 3, 2020). <https://swayam.gov.in>