# Chapter Five

# Video-based courseware for LMS envisioned on student learning outcome and non-cognitive skills

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**Abstract**
The effectiveness and efficiency of an innovative learning environment like Moodle LMS can be further enhanced by implanting high quality Video modules and courseware which is complementary and supplementary. Video modules were designed and developed based on pedagogical principles to offer the course according to Video Production principles, offered as Short videos to ensure student listening and ease of uploading. A website was developed and a customized Moodle LMS was embedded in the site. The courseware comprising the formative evaluation activities was designed and developed based on the 9-steps of Gagne's model. The video module was uploaded as video lessons in the website; various formative evaluation activities like Quiz, Assignment and Discussion forum were designed based on the Learning Outcome using revised Bloom's Taxonomy. The gain of the non-cognitive skills namely Attention and Motivation, Confidence in Communication and Self learning capability is assessed by a methodically designed questionnaire for each skill.

**Keywords:** MOODLE, Short videos, Gagne's Model, Revised Bloom's Taxonomy, Learning outcome (LO), ARCS Model, QAMLM

## Introduction

Elearning has shifted learning from a teacher-centred to student-centred procedure. For obtaining the intended results to the best possible extent, this shift in paradigm has to be supported by scaffolding techniques with sound pedagogical basis. Innovative methods in e-content development play a vital role in the process. Hence, research implementation in this area generates developments in the methodologies and techniques, most conspicuously, awareness, knowledge and training in the respective skills and eventually in attitudes in the participating teachers and students. From the prior research in the area, educational videos when followed up with the activities in LMS complement and supplement each other parenthetically work in increasing the effectiveness of the Teaching-learning process. Current research tends to assess this effectiveness by observing the performance of the student through

the learning outcome. In addition, an effort is made in assessing the gain of non-cognitive skills namely Attention and Motivation from listening to the videos, Confidence in Communication and Self-learning capability by participating in the Video-based course administered through the LMS Moodle.

**Moodle**

Modular Object-Oriented Dynamic Learning Environments (MOODLE) (Cole, 2005) is a free and Open Source Learning Management System. MOODLE is often considered as a Virtual Learning Environment with Social Constructivism as its basis originally developed by Martin Dougiamas at Curtin University in Australia. Fig 1.1 shows the salient features of the OS LMS Moodle justifying its selection as the VLE for the course administration.

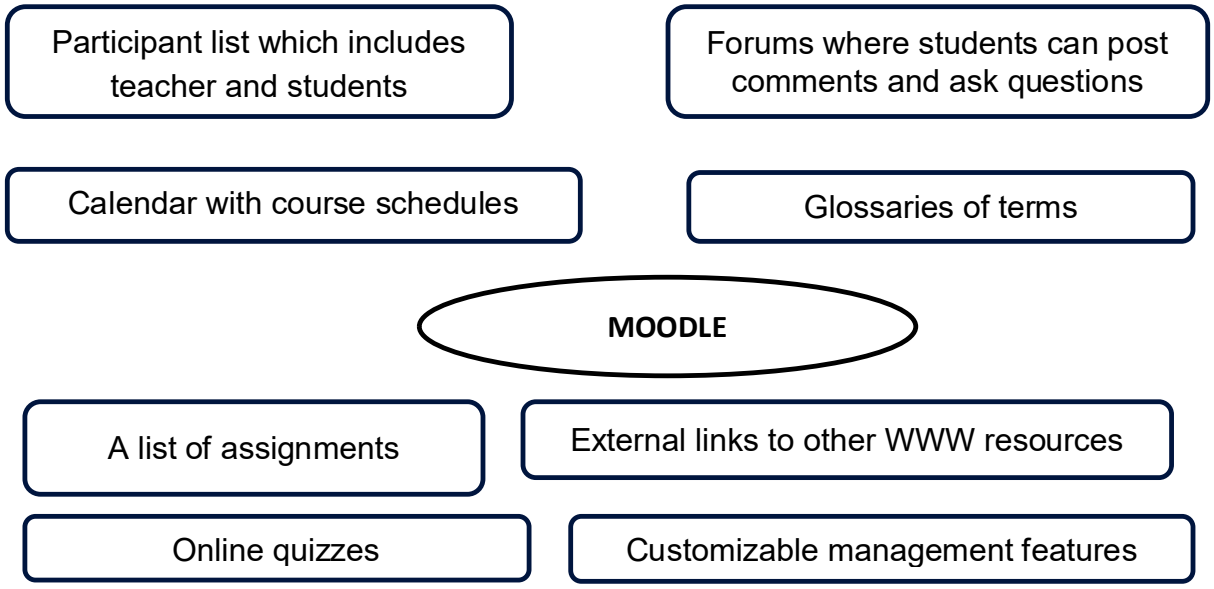


**Figure 1:** Features of the Open Source LMS Moodle

The results of the study conducted by Arun et al. (2013) to understand the perspective on the use of a Learning Management System (LMS) shows the excitement in 82% of the students to have LMS support to enhance their learning level. The LMS environment for the study was based on Moodle Platform; it is noted that the students believed that LMS would certainly help to gain more competitive advantage and excel in terms of academic outcome. More such studies justified the selection of the MOODLE platform for the study.

**Design and development of Video / courseware based on Pedagogical principles**

Video content (Bates, 2005) was designed and developed with the aim of initially gaining the Attention of students into the subject, then in sustaining the created interest and subsequently creating motivation in them to work in the subject area. The steps are described in Figure 1.2. Although every Educational Video is planned and captured with the direction by the presenter, who acts as the Subject Expert, the physical absence of students during the shooting schedule may be a hindrance in bringing out their wholesome expertise. The steps in fig 1.2 can be a useful guideline while creating the new paradigm of learning, the VLE or the online classroom.

For instance, the apt illustrations dealt in the classroom by a teacher can be expressed through the right visuals in the Video. Quality assurance (QAMLM by CEMCA, 2010) and Post production steps are vital for the feasibility in uploading the Videos into LMS.

**Design and development of courseware for Moodle based on 9-step Gagne's Model**

Gagne (2005) proposed a series of events which follow a systematic instructional design process that share the behaviourist approach to learning, with a focus on the outcomes or behaviours of instruction or training. Each of the nine events of instruction are shown in fig 1.3 with the respective expectation from the event given in parentheses respectively. Each event can be followed by sample methods to help implement the events in your own instruction. Gagne's nine events can be used in conjunction with Bloom's Revised Taxonomy (Bloom, 1956) to design engaging and meaningful instruction (Gagne et al., 2005).

**Learning outcome and Non-cognitive skills**

A learning outcome is a clear representation of what a learner is expected to be able to do, know about and/or worth at the completion of a unit of study, and how well they should be expected to accomplish those outcomes. It states both the ingredient of learning and how its accomplishment is to be demonstrated. Learning outcomes in addition to serving the purpose of directing the content and design of a unit of study, they form the base of assessment and are also linked to the larger outcomes of learning set by the University in the form of generic and/or course/discipline-specific graduate attributes.

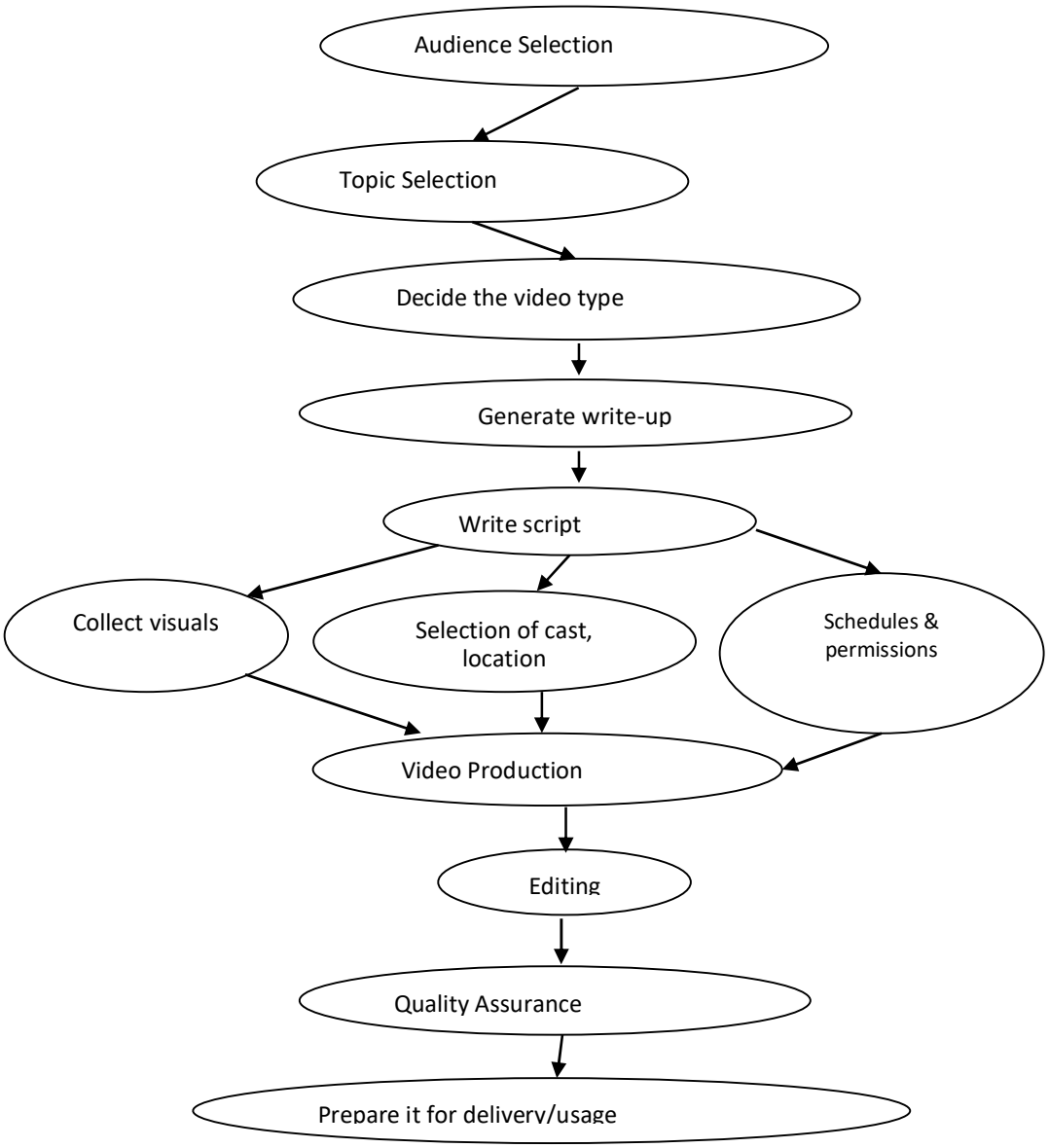


**Figure 2:** Steps in video production

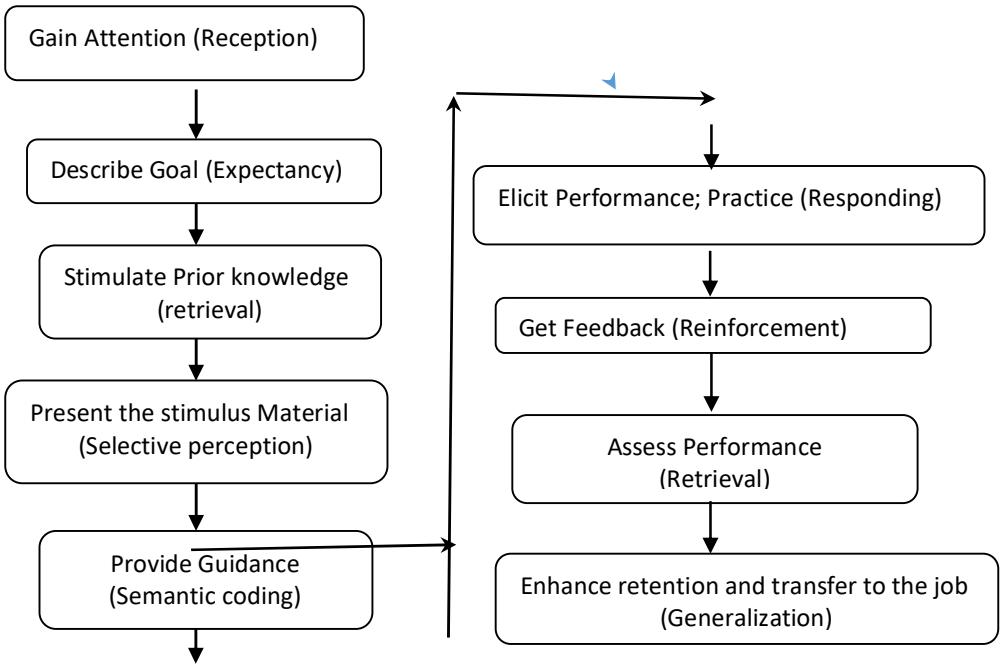


**Figure 3:** Block diagram of Gagne's Model

Sallam and Alzouebi (2014) in their study to investigate the perceptions of a teacher toward the use of Moodle LMS, to enhance the quality of Teaching and Learning, explored the effectiveness of Moodle as a tool for enabling learners' motivation. Paynter and Bruce (2012) have undertaken two case studies relating to the effectiveness of Moodle in Teaching and Learning process; in these they have demonstrated the implementation and assessment of the effectiveness of Moodle in enhancing the student engagement and learning outcome. Aside from cognitive outcomes, there are identified non-cognitive constructs that are developed during and after exposure to LMS which includes self-regulation (Magno & Ocampo, 2015), engagement (Rashid & Asghar, 2016), and motivation (Mayer, 2014). It is notable in studies that students develop specific skills while going through lessons that are delivered via LMS as explained by the cognitive affective multimedia learning (Brunken, Plus, & Moreno, 2011). These non-cognitive skills include self-regulation, motivation, and engagement. There is a call for more research that empirically examines theoretically grounded constructs of learning and motivation in the context of learning with the use of LMS (Lepper & Wolverton, 2004). One of the major indicators of student learning is their performance overtime after the use of computer-based learning environments such as the LMS. The performance is determined as a result of the material and competencies presented to learners.

### ARCS Model

The ARCS Model (Keller, 1987) of motivation was developed to find effective ways of understanding the major influences on the motivation to learn, and for systematic ways of identifying and solving problems with learning motivation. The resulting model contains a four category synthesis of variables that encompasses most of the areas of research on human

motivation, and a motivational design process that is compatible with typical instructional design models.

## Methods

A website was proposed to be created with Moodle customized in it. Computer Science students are considered as the target audience; Object Oriented Methods is chosen as the topic for the course. Video contents were to be designed and developed based on pedagogical principles; the other courseware for the LMS namely the text lessons and the formative evaluation tools quiz, assignment and forum had to be designed and developed based on Gagne's Model and revised Bloom's Taxonomy. The Formative Evaluation tools and Video content were to be developed with the plan for assessing Learning Outcome described in Section 3.

**Schema of the work: Research preparations**

- Video lessons were designed, developed and prepared for administration through LMS after being validated by experts through a questionnaire with criteria from Quality Assurance for Multimedia Learning Materials (CEMCA, 2010).
- Activities in LMS were designed based on Gagne's 9-step model, with revised Bloom's Taxonomy used to design questions for formative evaluations; Implementation plan and preparations made
- Design of questionnaires for self-assessment of student gain of non-cognitive skills.

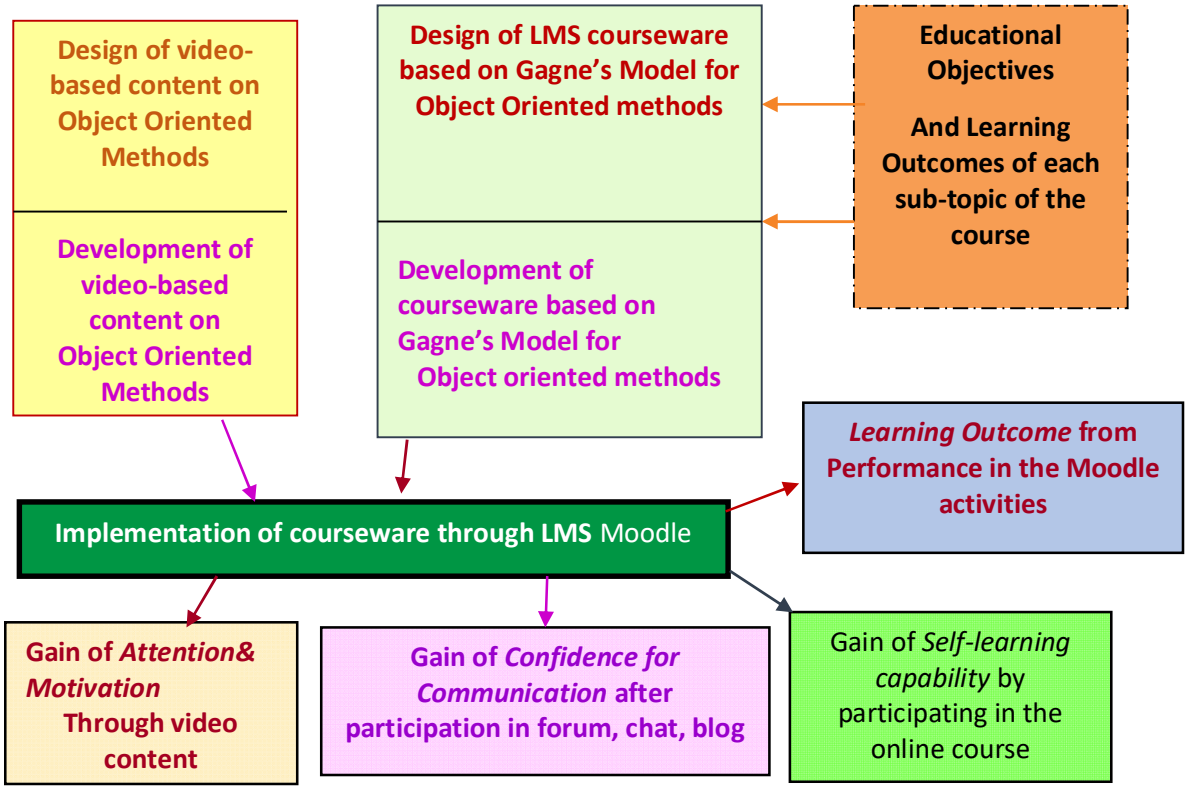


**Figure 4:** Schema of the work

### Video content

Based on the procedure in Table 1 the stages were carried out. The basis for deciding the topic, division of modules, all based on the major factor Learning Outcome which will be explained in Section 3. The detailed design encompasses primarily the fact that in every stage of Video production, from collection of resources, editing and preparation for uploading, the fundamental principles are recalled and imbibed.

**Table 1:** The stages

| **Stage of video production** | **SubTopic1** | **SubTopic2** | **SubTopic3** |
|---|---|---|---|
| Audience Selection | Students studying in B.E. / B. Tech. /B.Sc. /M.Sc. programmes in CSE, MCA | | |
| Topic Selection | Introduction to Object oriented Methods | Object oriented programming through C++, Java | Trends in object oriented approach |
| Generation of write-up | Instructional material | Instructional material | Instructional material |
| Script from write-up | Script | Subject Expert Presentation | Subject Expert Presentation |
| Cast | 1. IT employee who completed college last year<br>2. II Year B.Tech student | 1.Computer Science Professor<br>2. B.Tech Computer Science student | 1) Computer Science Professor<br>2)Computer Science Professor<br>3) Computer Science Professor |
| Schedules & permissions | Getting the schedules of subject experts and production crew together took nearly 2 months | 1. Getting Professor's schedule took 3 months<br>2. Getting Student's schedule took 10 days | Totally 2 months, since separate interviews are taken. |
| Collection of visuals & audio | Visuals for various concepts, examples<br>Appendix 1b | PowerPoint slides designed by the presenters | PowerPoint slides designed by the presenters |
| Video production – shooting | Was done on one day after rehearsals<br>The Cast, the crew, the course creator present | Was done on one day after rehearsals<br>The Presenter, the crew, the course creator present<br>The Presenter, the crew, the course creator present | Professor presented his portions – 1 day<br>A Professor presented his views<br>Professor presented her views |
| Editing | Done in a week | Done in 2 weeks | Done in 2 weeks |
| Quality Assurance | Done by the production crew, course creator during editing, then by Subject Experts with QAMLM standards | | |
| Final video | 1.88.24 min video on Object oriented Methods | | |

| | | | |
|---|---|---|---|
| | 2. Available as 4 videos on 4 sub-topics | | |
| Presentable size & format | 2 video clips in MP4 format | 13 video clips in MP4 format | 3 video clips in MP4 format |

### LMS courseware based on Gagne's model

Courseware for LMS was designed based on 9-step Gagne's model as described in Section 1.3. Hollis (2012) discusses how Moodle modules can be designed based on the 9 steps of instructions of Gagne's model. Based on this Moodle modelling, the course on Object oriented methods was designed as given in Table 2.

**Table 2:** Moodle modelling based on 9-step Gagne's model

| Step# | Aim | Implementation |
|---|---|---|
| 1. | Gain attention | ➢ Pulse video on clicking<br>➢ Division of the course into sub-course topics.<br>➢ Motivation messages in the news forum for each sub-topic |
| 2. | Describe Goal | When each sub-topic is clicked, students see the respective goals |
| 3. | Stimulate prior knowledge | Quiz is prepared for each sub-topic; Displayed on the home page. Students can enter the quiz just on a click. |
| 4. | Present material | When the sub-topic is clicked, file names of video contents and text contents are displayed to facilitate easy access. |
| 5. | Provide guidance | As they learn from the content, for any clarifications, a blog is opened for each sub-topic for free communication to students through Blog posts. Teachers are motivated to guide the students continuously during the course days. |
| 6. | Elicit performance | A discussion forum is opened for each sub-topic. All students and all faculty members participate, clarify, contribute, compliment and by the way encourage each other. |
| 7. | Provide feedback | An assignment on each sub-topic is provided. The submission is followed by a discussion through a blog. It is called a Workshop activity. |
| 8. | Assess performance | An Assessment quiz on each sub-topic. |
| 9. | Ensure Retention & transfer | Repeat steps 6 to 8 several times until satisfied with results.<br>Concluding remarks in the news forum of every sub-topic is meant for the purpose. |

Each tool is designed with the rules framed based on the Learning objectives of the particular tool; Rubrics are designed for evaluating student performance in each tool. For instance, the rules for designing the quiz and the rubrics are given below.

**Learning Outcome (LO)**

**Introduction**

Learning Outcome (LO) must be practised all through the learning process. Accordingly, the implementation was done all the way through the course starting from the design of the resources, through the activities and formative evaluations during the course and till the end of the course.

**Plan for assessing LO**

When the curriculum is framed, the course topic is divided into suitable Sub-topics, keeping in consideration the feasibility, benefits for the students. For the overall course and for each sub-topic the expected outcomes are noted. Subsequently, the Learning Objectives and the Learning Outcomes are formulated. Formative Evaluation method / tool weightages are formulated accordingly.

**Implementation of LO**

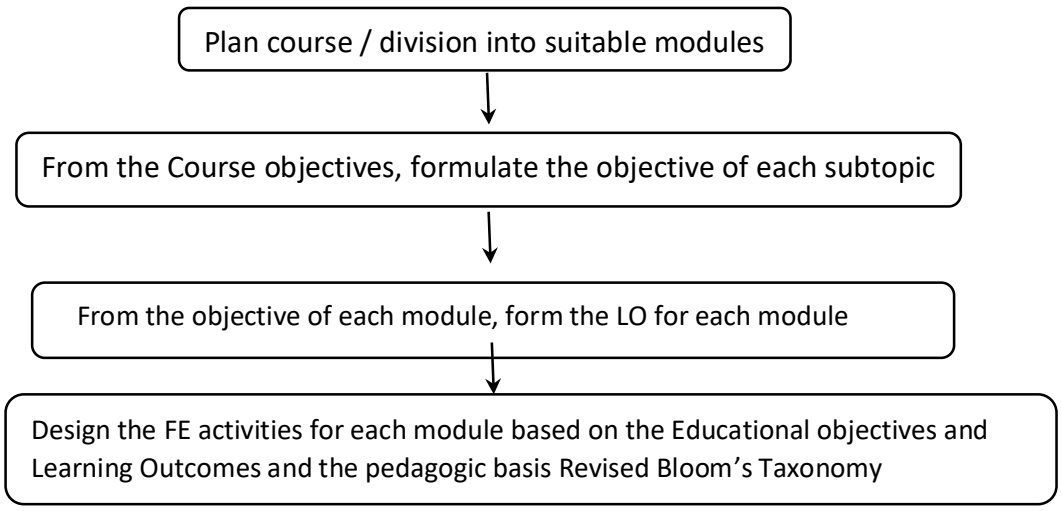


**Figure 5:** Implementation of LO

Based on the procedure in fig 3.1, the plan to implement LO is formulated. Table 3.1 from the Course Specification demonstrates the formulations. From the table, it can be observed that depending upon the nature of a sub-topic, the skills to be decided as outcomes and hence the weightages for the formative evaluation tools can vary, though all are given equal weightage in this case; the reason for equal weightage is the short duration for the course administration. Following the design of weightages for the formative evaluation tools, the design of the tool quiz is demonstrated which includes the guidelines for question paper setting, evaluation and the evaluation rubrics.

**Table 3:** from the Course Specification

| No. | **Intended Learning Outcomes (ILOs)** |
|---|---|
| | **Knowledge** |
| 1 | Describe the significance of object-oriented approach |
| 2 | Describe the principles of object-oriented programming |
| 3 | Describe the trends in object-oriented approach |
| | **Intellectual Skills** |
| 4 | Design and analyze Problems |
| 5 | Apply the concepts of data encapsulation, inheritance, and polymorphism to real-life problem solving |
| 6 | Create computer algorithms to solve different problems |
| 7 | Design software solutions to real world problems |
| | **Professional Skill** |
| 8 | Decide the suitable object programming language |
| 9 | Design and develop object-oriented computer programs |
| | **Transferable Skill** |
| 10 | Formulate problems as steps so as to be solved systematically |
| | **Attitude** |
| 11 | Develop software with team-work in mind |

**Table 4:** Mapping of ILO to contents

| Criteria | **Knowledge** | **Intellectual skills** | **Professional skills** | **Transferable skills** | **Attitude** |
|---|---|---|---|---|---|
| Introduction to Object oriented Methods | 1 | 4,5 | | 10 | 11 |
| Object oriented programming | 2 | 6,7 | 9 | 10 | 11 |
| Trends in Object Oriented Methods | 3 | - | 8 | - | - |

**Table 5:** Assessment

| Assessment Methods | Weightage | | | Remarks |
|---|---|---|---|---|
| | IOOM | OOP | TOOM | Names of the sub-courses |
| Discussion forum | 10 | 10 | 10 | Scores based on the rubrics |
| Assignment | 10 | 10 | 10 | Scores based on the rubrics |
| Quiz | 10 | 10 | 10 | Scores based on the rubrics |
| Total | 30 | 30 | 30 | Result in each course |
| Grand Total | 90 | | | Consolidated result of the course |
| Chat & Blog | Conducted, but not used for assessment | | | |
| News forum | | | | |

## Activity Quiz

### Formulation of the activity quiz

- Based on revised Bloom's taxonomy, the questions were framed for the Assessment quiz in each sub-topic to be conducted at the end. The pre-assessment quiz was conducted at the

beginning of each sub-topic to stimulate knowledge, i.e, each question paper was designed in such a way that there are more known questions for which they are expected to know the answer in order to attend the particular sub-topic. The idea is to give confidence while reviving the earlier learnt.

- For the Assessment quiz, questions were tough testing the student's learning, purposely providing the student an opportunity to reflect on the learning.
- Most of the questions are of the type Multiple Choice Questions. True or False questions were also given.
- The feedback for the right answer is important; for a wrong answer it is more important. While planning the feedback comments, the teacher had to empathize with the student and give the comment prior. It should encourage the student; but to progress calmly and peacefully, and not to sit and relax.
- Quiz permits the creation of a question bank to be created and questions from the pool and shuffled to form different question papers.

**Evaluation guidelines for Quiz**

The performance in the quiz can be evaluated by analyzing the level of preparedness and the quality of presentation through the following conditions:

A. Contribution
B. Class and performance

The activity **Quiz** was designed for a score of 8 distributed across these 2 conditions that were to be evaluated namely Contribution and Class & performance. These conditions had to be evaluated with a rating value ranging from 4 to 1, 4 being the highest rating and 1 being the lowest rating for each condition. Thus, the total highest score that a student could achieve in the quiz activity was 8 and the lowest score 1. The rubrics for evaluation are provided in Table 6.

**A. Contribution**

The idea that students attempt the quiz itself was a great effort and it must be appreciated. So, it was decided to be considered and eventually added to the learning outcome.

**B. Class and performance**

In the template meant for activity quizzes in Moodle, the answer for each question and remarks is to be given while uploading questions through the question paper template. The students can get the answer to a question, immediately after completing the question. However, the student can have the option to either see it together at the end of the quiz or try for successive trials with a penalty. Successive trials of the student and the tendency to perform to the best are accounted for under this condition.

Total score = (1 to 8) / 8 in each quiz.

It was converted to out of 10 and tabulated for the pre-assessment quiz activities and the three Assessment quiz activities.

**Table 6:** Rubrics for evaluation of quiz

| S. No. | Criteria | Excellent | Good | Average | Poor | Score |
|---|---|---|---|---|---|---|
| 1. | Contribution | Attempts the quiz when it has been opened and is well prepared to answer all questions. | Attempts the quiz when it has been opened and answers only 80% of questions. | Attempts the quiz when it has been opened and answers only 50% of questions. | Attempts the quiz when it has been opened and answers less than 50% of the questions. | |
| 2. | Class and Performance | Keeps returning to the material until the student has mastered it | Keeps returning to the material until the student has mastered it. (80%) | Keeps returning to the material until the student has mastered it. (50%) | Attempts only once irrespective of the marks obtained. | |

The other two Formative Evaluation tools namely Assignment and Discussion forum are formulated just like Quiz with the pertinent criteria.

### Evaluation of performance in Moodle activities

The scores of each student in the assessment activities of the three sub-topics are provided by the participating teachers as per the guidelines for assessment. For each of the three sub-topics of the course, the evaluations done are:

1. Discussion forum - as per the scoring rules in the rubrics
2. Assignment - as per the scoring rules in the rubrics
3. Assessment quiz - as per the scoring rules in the rubrics

Consolidated score was calculated for each student by adding the total scores in the three sub-topics out of 30 each the total out of 90. From this, a consolidated % score was calculated. The data are recorded and prepared for analysis.

### Evaluation of learning outcome

The learning outcome for each student was evaluated by considering the percentage of assessment score as per rubrics described in the course specification. The learning outcome

grades are evaluated as per the rubrics in Table 3.3 and presented to each student through a Performance Certificate. It is sent to each student at course completion through email.

**Table 7:** Rubrics for evaluation of learning outcome from performance scores

| **Criteria** | **Excellent (> 90)** | **Good (76-90)** | **Satisfactory (61-75)** | **Marginal Pass (50-60)** | **Fail (<50)** |
|---|---|---|---|---|---|
| Introduction to Object oriented Methods | The student acquires excellent knowledge in the need for OO approach | The student acquires good knowledge in the need for OO approach | The student acquires satisfactory knowledge in the need for OO approach | The student acquires a very little knowledge in the need for OO approach | The student has not acquired any knowledge in the need for OO approach |
| Object oriented programming | The student acquires excellent knowledge in the principles of object-oriented languages, namely, data encapsulation, inheritance, & polymorphism in C++ and Java. | The student acquires sufficient knowledge in the principles of object-oriented languages, namely, data encapsulation, inheritance, and polymorphism in C++ and Java. | The student acquires average knowledge in the principles of object-oriented languages, namely, data encapsulation, inheritance, and polymorphism in C++ and Java. | The student is able to describe the meanings of data encapsulation, inheritance, and polymorphism, and to give simple examples on them from C++ and Java. | The student is unable to describe the meanings of data encapsulation, inheritance, and polymorphism, and to give simple examples on them from C++ and Java. |
| Trends in Object Oriented Methods | The student acquires excellent knowledge in the current and future applications of object oriented methods | The student acquires good knowledge in the current and future applications of object oriented methods | The student acquires satisfactory knowledge in the current and future applications of object oriented methods | The student acquires a very little knowledge in the current and future applications of object oriented methods | The student have not gained any knowledge in the current and future applications of object oriented methods |

**Non-cognitive skills**

Questionnaire for self-assessment of gain of Attention and Motivation through the Video-Based Course through LMS Moodle

### Attention and motivation

Based on the characteristics described in Section 1.5, the criteria can be formulated to create the questionnaire to measure motivation. Considering the engagement and motivation aspects, the gain of the attitude 'Attention and Motivation' as a result of viewing the video can be assessed. The questionnaire to measure the effectiveness of the video is hence formed using the 9 characteristics to assess the gain of Attention and Motivation by listening to the video content listed as:

- Stimulation of curiosity
- Quality helping to hold attention
- Appease
- Element of surprise
- Presentation enabling ease of understanding
- Enjoyable when recollected
- Content matching student's personal interest
- Inspiration for software development
- Inspiration for video content development

Each of these statements was rated on a scale of 1 to 5. The questionnaire to measure Attention and Motivation was prepared on five point Likert-type scale and the objects labeled as:

Strongly disagree : 1, Disagree : 2, Neutral :3, Agree : 4, Strongly agree : 5.

### Validity and reliability

Validity was tested by qualified and competent Professors. The reliability of the "Attention and Motivation" questionnaire was tested by calculating Cronbach Alpha Coefficient. The value of Cronbach Alpha was 0.78 which is better than the acceptable limit of 0.6. Reliability of the survey instrument is the measure to determine the consistency of similar measures in a scale in producing similar results (Rosenthal & Rosnow, 1984). It has two dimensions, namely, repeatability and internal consistency. Internal consistency refers to the ability of a scale item to correlate with other items in the scale that are intended for the measurement of the same construct. Items measuring the same construct are expected to be positively correlated with each other. A common measure of internal consistency of a measurement instrument is Cronbach's alpha (Cronbach, 1951). In general, a scale is considered reliable in measuring the construct, if the Cronbach's alpha value is greater than 0.7 (Nunnally, 1978).

## Questionnaire for self-assessment of gain of confidence for communication by attending course through LMS Moodle

### Confidence for communication

Based on the characteristics of engagement and motivation, it is understood that, Confidence is an affective aspect which causes Engagement, Challenge of expression is created by Cognitive engagement and the interest and initiative to share the learning experience, and

Interactions show the Behavioral engagement. Hence with characteristics from engagement aspects and ARCS instructional model of Motivation, the characteristics for gaining Confidence for Communication are located. The following 11 characteristics comprise the assessment of the gain of Confidence for Communication by participating in the activities of the LMS Moodle.

- Encouragement for active participation
- Variety of resources and activities retaining attention
- Participation in small group discussions – starters
- Initiative to interact with teachers to review assignments, tests or to ask doubts
- Contribution to discussions through questions
- Challenge to express
- Motivation to complete tasks for future Satisfaction in activity completion
- Gain of confidence to express ideas through discussion forum participation
- Feedback and comment
- Confidence and interest to share the experience with others

Each of these statements was rated on a scale of 1 to 5. The questionnaire to measure Confidence for Communication was prepared with a five point Likert-type scale and the objects labeled as:

Strongly disagree : 1, Disagree : 2, Neutral :3, Agree : 4, Strongly agree : 5.

**Validity and Reliability**

Validity was tested by qualified and competent Professors. The reliability of the "Confidence for Communication" questionnaire was tested by calculating Cronbach Alpha Coefficient. The value of Cronbach Alpha was 0.86 which is better than the acceptable limit of 0.6.

**Questionnaire for self-assessment of gain of Self-learning capability by attending the Video-Based Course through LMS Moodle**

**Self-learning capability**

Based on the qualities of Self learners as discussed and approved by Bandura (1994), the questionnaire meant to measure self-learning capability is designed with 7 criteria as listed below:

- Enjoying discovery of new ways for task completion
- Trying to get the association between unknown to known
- Developing useful ways to learn
- Active participation in class activities
- Ability to find ways to make the course interesting
- Confidence to self-learn and perform well
- Interest to extend the experience gained to other subject learning

- Scoring of the variable

Each of these statements were to be rated on a scale of 1 to 5. The questionnaire to measure Self-learning capability was prepared with a five point Likert-type scale and the objects labeled as:

Strongly disagree : 1, Disagree : 2, Neutral :3, Agree : 4, Strongly agree : 5.

**Validity and reliability**

Validity was tested by qualified and competent Professors. The reliability of the "Self-learning capability" questionnaire was tested by calculating Cronbach Alpha Coefficient. The value of Cronbach Alpha was 0.72 which is better than the acceptable limit of 0.6.

**Implementation, data collection and analysis**

The researcher approached Principals, HODs, concerned faculty, met students as a whole class and a few faculty members. While meeting the students, the researcher made a presentation on the significance of the problem in hand and explained to them about how they may be benefitted by participating in the course. Then the researcher got the contact details of students and their opinions about the research project by distributing a hardcopy of a questionnaire and getting it filled up. Also a pretest was conducted. They were given an introduction about working with Moodle. The researcher took the responsibility of registering the students and faculty from an institution into the course. The contacts throughout the course and tests at the end were conducted fully online.

After the course is administered for a week for batches of size 30 students and 4 faculty members, as per a schedule with defined roles and responsibilities to the faculty and students, the self-assessment questionnaires are administered to the students through Moodle and responses are collected from around 400 students. The collected data are analyzed.

**Conclusions**

A critical appraisal of the existing literature and research reports on the technology enabled learning, constructivist theory, cognitive theories of learning suggest that students learn better when the instruction is provided in visual format using "Videos". Hence, when video based learning mode is embedded in LMS tools like Moodle, it could benefit the students by enhancing their understanding, engagement and ultimately improving their learning outcome. When the design and development is based on the improvement in the LOs and non-cognitive skills, the module may become more fruitful. This fact supports the attempt of the researcher in undertaking the current problem. The rationale of this research was to "Design and Development of Video-Based Courseware for LMS envisioned on LO and non-cognitive skills"; subsequently measure the effectiveness of the same by administering with a sample of students.

The research work was divided into different parts. The focus of the first part was on the design and development of the video-based lessons on "OOAD" to be administered through the Moodle LMS. The focus of the next part was on observing the effectiveness of the video-based lessons when administered through LMS; assessment of the learning outcome of the students and assessing the gain of non-cognitive skills namely "Attention and Motivation", "Confidence for Communication" and "Self-Learning capability" by participating in the course. A formative evaluation of the video based learning using Moodle LMS was also undertaken by analyzing the interactions and experiences of students with tools of LMS like Quiz, Assignment, Forum and Chat. The final part of the research focused on the measurement and analysis of experiences of students and faculty members with the proposed video-based courseware on Moodle LMS.

**Design and development of video modules & LMS courseware**

Video production was done based on a pedagogical basis. The developed Video was validated for content and constructed by subject and media experts respectively. A questionnaire was designed based on QAMLM standards prescribed by CEMCA; opinion was obtained from 60 faculty members who taught Computer Science.

As the step towards Implementation of the course, the website www.mahalmsforcs.com a schedule is formed; the roles and responsibilities are formed. The four roles are Administrator, Course Creator, Teacher and Student. The researcher played the role of site administrator and course creator. The responsibilities and roles are planned for 3 stages namely (i) before the course, (ii) during the course and (iii) at the end of the course. The responsibilities include giving support, confidence and instruction to the participating teachers and students at every stage regarding how to gain entry and take up the course till completion.

**Learning outcome & non-cognitive skills**

The results of comparison between the pre-test (M = 84.88) and the post-test (M = 87.79) show that there was significant gain in the knowledge of students on "Object Oriented Methods" due to the participation in Video-based courses through Moodle LMS. The level of significance was 0.01 level with paired sample t-value as 10.606. Learning Outcome of each student was evaluated on the basis of the performance in the course activities as a percentage and a grade based on rubrics; the score and grade were presented to the students through a Performance Certificate sent through email on completion of the course.

The analysis of data collection from the students showed a more positive perception toward the Video based Course on "Object Oriented Methods" using Moodle LMS. The mean rating of students for the variables are "Attention and Motivation" (M = 4.24), "Confidence for Communication" (M=4.46) and "Self-learning Capability" (M=4.30) each out of 5 was better.

**Experiences during design, development of video**

Some of the experiences gained by the researcher in the design and development of Video Content Using Moodle LMS is explained below:

Video content development is found to be expensive in terms of resources required which includes a studio, equipment, trained manpower and supporting manpower.

1. Bringing together the subject experts and the media experts in the production crew is the most difficult job, since each of them has his own tight schedules.
2. Creating write-up, development of script, and collection of visuals are done with better quality in shorter durations when done in a team of like-minded experts rather than done alone.
3. While the job of developing examples for abstract concepts is challenging, it can be extended to an innovative way, that is, good lecture videos from the available repositories can be taken and contemporary examples in the form of visuals including images, videos and animations can be added to give it a new appeal.
4. Though video production is done with a clear plan and taken care of at each stage, achievement of 100 percent of what is conceived and perceived before developing the video in the case of Educational Video Production where heavy budget allocation is difficult.
5. Video through LMS provides an opportunity to add the left out portions of the content that could not be included in the video to be added through the resources in the courseware for the LMS like text and PowerPoint presentations.

**Experiences during implementation of moodle course**

Some of the experiences gained by the researcher in the implementation of the course using Moodle LMS is stated below:

1. Ensuring students' participation in the course was not easy in the beginning of every batch. They had to be motivated and clarifications with reminders on the course through Email, SMS and calls in mobile phones were found necessary.
2. Students expressed eagerness to learn, once they understood how to use the tools in Moodle for the various activities.
3. Managing the files and various scores and the network traffic in the site was a challenging job.
4. Training the faculty in the use of the LMS was challenging in each batch, the reason being they were overworked and had less time to explore into Moodle, and then to guide the students in the course
5. However, most of the faculty found it useful, interesting and rewarding at the end of the course.

**Limitations**

Some of the limitations of the current research work are listed below:

- The course was administered only for a short period, a week covering a part of the subject Object Oriented Methods (OOM).
- Only a few activities like "Quiz", "Assignment", "Forum" were included in the Moodle LMS framework in this research.
- Only three non-cognitive skills were considered in this research.

- Only a quasi-experimental study was conducted.

**Recommendations and suggestions**

The major recommendations and suggestions provided as an outcome of the research study is given below:

- The teaching and learning process should not be confined solely to the traditional mode involving lectures (one way communication). Rather other approaches in teaching and learning like ELearning have to be introduced effectively.
- The study recommends that faculty members are provided training in creating video based lectures on their favorite subjects.
- It is recommended that education institutions can form a team comprising a team of students and faculty members to make videos on each subject and store them in the repository for common access and usage.
- It is also suggested that existing videos lectures and online instructional resources can be used after seeking appropriate permissions instead of creating video lessons for all the modules in the syllabus.
- It is recommended that institutions can consider mandatorily introducing at least one Moodle LMS based course in initial years of graduate study.
- Formative evaluation activities and weightage given can be flexible based on the type of the topic rather than making the same pattern for all courses.
- As the course progresses, more questions and more quiz events at higher order thinking skills can be given as an added option for better performers to raise themselves still higher.
- It is recommended to prepare courses in different formats and media so as to accommodate students with different learning styles and learning orientations.
- The motto of every ELearning initiatives in the institutions should focus on four factors viz. reusability, interoperability, accessibility, and modularization.
- The success of LMS based ELearning courses strongly depends on the commitment of teaching faculty. Hence, it is suggested that training has to be imparted to teaching members by organizing workshops, interventions and short term courses from time to time, so as to empower teachers and enable them to develop their own courses effectively.

**Scope for future research**

Some of the scope for further research in the present work is highlighted below:

- The effectiveness of video-based learning can be investigated in detail with different types of videos contents like video lectures, animations, simulation videos, animated characters and others.
- Effectiveness of video-based learning on improving students' outcome can be investigated for different courses with longer duration involving more contents.
- The effectiveness of different LMS (other than Moodle) can be investigated by integrating video based learning. The results of students' experience and learning outcome across different LMS based learning can be compared.

- The study was conducted as a cross-sectional study in which students attended the video based LMS course simultaneously. It is suggested that future research may focus on conducting a longitudinal study involving the same set of samples (students) over a period of time and investigating their involvement, engagement and measuring their learning outcome.

## Conclusion

The growth and development in the Elearning tools and technologies pose significant challenges and opportunities to the educators in designing the learning experiences for millennial students. The insights and cognizance gained from the review of literature together with the inputs from the experts enabled the researcher to design and develop an effective video based courseware in "Object-Oriented Methods (OOM)" and implement the course in Moodle LMS. A convenient sample of 400 student respondents who attended the course in Moodle LMS were optimistic by expressing their positive experiences with the proposed Elearning environment. The results of the data analysis has evidenced the results of the evaluation of videos.

## References


1. Arun, A. E., Kannan, K., ShobhaRani, R. H., Sundaresh, K. N., Shekar, H. S., & Ramjan, S. (2013). Study Pattern and Need for Learning Management Systemfor Pharmacy Practice Students of Select Colleges in South India: A Pilot Study. *Indian Journal of Pharmacy Practice*, 6(1), 59-68.
2. Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), Encyclopedia of human behavior (Vol. 4, pp. 71-81). New York: Academic Press. (Reprinted in H. Friedman [Ed.], Encyclopedia of mental health. San Diego: Academic Press, 1998).
3. Bates, A. T. (2005). *Technology, Elearning and distance education*. Routledge.
4. Bloom, B. S. (1956). Taxonomy of educational objectives. Vol. 1: Cognitive domain. New York: McKay, 20-24.
5. Brunken, R., Plass, J. L., & Moreno, R. (2010). Current issues and open questions in cognitive load research. In J. L. Plass, R. Moreno, & R. Brunken (Eds.), Cognitive load theory (pp. 253e272). New York: Cambridge University Press.
6. CEMCA (Commonwealth Educational Centre Media For Asia) (2010) Quality Assurance of MultiMedia Learning Materials (Version 1.0), New Delhi: CEMCA.
7. Cole, J. (2005). Using MOODLE: Teaching with the Popular Open Source CourseManagement System, ISBN: 0596008635, O'Reilly.
8. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. psychometrika, 16(3), 297-334.
9. Falleiro, S. S. (2013). A study of the effectiveness of the learning management system on student engagement motivation and performance in higher education.
10. Gagne, R. M., Wager, W. W., Golas, K. C., Keller, J. M., & Russell, J. D. (2005). Principles of instructional design. *Performance Improvement*, *44*(2), 44-46.
11. Hollis, K. Category Archives: Instructional Design. environments, 48(3), 23-48.
12. Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of instructional development*, 10(3), 2.
13. Lepper, M., & Wolverton, M. (2004). The wisdom of practice: Lessons learned from the study of highly effective tutors. In J. Aranson (Ed.), Improving academic achievement: Impact of psychological factors on education (pp. 135–158). New York, NY: Academic Press.
14. Magno, C., & Ocampo, J. C. (2015). A metanalysis on the standards-based assessment of students' school readiness in an open high school program. *Journal of SBA Research*, 3, 25-34
15. Mahalakshmi, R., & Suresh, E. S. M. (2010). The design and development of courseware for MCA students through LMS. *Indian Journal of Science and Technology*, 4(1), pp .[64 – 67]
16. Mahalakshmi, R., & Suresh, E.S.M. (2014), 'Design and Development of Courseware for LMS', *International Conference on Advancements in Computing Sciences, Information*

*Techniques & Emerging E-learning Technologies', ACSITEET-2014, Conference Proceedings Communication Technology*, Vol 4, No.3, 2014 ISSN0974-2239, pp[285-291]

**17.** Mahalakshmi, R., & Suresh, E. S. M. Educational Videos through LMS for Improvement in Non-Cognitive Skills of Computer Science Students. | e-ISSN: 2319-8753, p-ISSN: 2320-6710| www.ijirset.com | Impact Factor: 7.512|, Vol 9, Issue 6, June 2020, IJIRSET © 2020, An ISO 9001:2008 Certified Journal, pp[5133-5146]

**18.** Mayer, R. E. (2005). Cognitive theory of multimedia learning. *The Cambridge handbook of multimedia learning*, 41, 31-48.

**19.** Nunnally, J. C., & Bernstein, I. H. (1978). Psychometric Theory McGraw-Hill New York. The role of university in the development of entrepreneurial vocations: a Spanish study

**20.** Paynter, M., & Bruce, N. (2012). Case Studies: Using Moodle for Collaborative Learning with University and Senior Secondary Students.

**21.** Rashid, T., & Asghar, H. (2016). Technology use, self-directed learning, student engagement and academic performance: Examining the interrelations. *Computers in Human Behavior*, 63, 604-612

**22.** Sallam, N., & Alzouebi, K. (2014). Teacher Perceptions of the Use of Moodle to Enhance the Quality of Teaching and Learning in a K-12 Private School in the United Arab Emirates. *Journal of Teaching and Teacher Education*, (2), 93-102.