

## Exploring Innovative Methods for Online Education

**Anita Venugopal\***

*Dhofar University, Dhofar, Sultanate of Oman*

**\*Corresponding Author:** Anita Venugopal, Dhofar University, Dhofar, Sultanate of Oman.

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### Abstract

Research suggests that online teaching has emerged as a crucial field of study in virtual education. The central aim of online teaching implies integration of new electronic devices and technologies in such a way so that it meets the goals of the curriculum and student learning environment without affecting the active learning in both online and offline mode. Many effective teaching methods are practiced by the educators to deliver the course online during class hours and outside class. In this paper, we present student's response in promoting self-learning and collaborative-learning approaches. To achieve this, proper implementation and structuring of course modules, usage of appropriate software's, proper organisation of learning aids are considered to meet the competency needs of students that supports to enhance their self-learning abilities. Student evaluation during class hours enables educators to analyse effectiveness of teaching in online classes. The results of this approach is evaluated by collecting student's response.

**Keywords:** Virtual learning strategies, e-learning, peer learning.

### Introduction

Teaching online is a challenging job and there are several challenging factors instructors have to face to effectively being prepared to teach online especially when it comes to teaching practical sessions of information technology (IT). Many research studies have been carried out and there are different approaches that are used to train students online. In this paper, we present an approach that requires students to follow certain protocols prior to appearing the online class. Students do self-learning before class hours (LBC) and their level of understanding is checked by instructors during online session by solving activities in class (AIC). The main objective of this approach is to enhance students self-learning abilities by giving them the ownership of learning so that students develop the ability to tackle unstructured real situation problems independently. Instructors provide adequate learning materials and activities [16]. The main challenge faced by teachers in this regard is to clear the misconceptions, fear, potential problems regarding self-directed learning as opposed to traditional learning and in the preparation of teaching materials, collection of resources such as video lessons, activities, quizzes, establishing clear communication, developing grouping strategy, selection of media etc.

In this paper, section 2 is literature survey, section 3 focusses on the strategy used, its workflow, preparatory materials uploaded and resource collection, section 4 discusses the results obtained and section 5 presents the conclusions and future study.

## Literature Survey

Flipped learning teaching objectives are to build students self learning efficacy so that they can learn themselves. Students are asked to go through preparatory lessons prepared and uploaded in the website by their instructors [2, 3]. This practice was implemented in the economics subject [4] and was followed in English, Mathematics [5], Biology [6], Business Management [2], Industrial Engineering [3] and Computer Science [7, 16]. Results show that this method can be practiced to handle any level of students, graduate or undergraduate, as well as, any class of size small or large [2, 16]. Results reveal that peer learning is effective and at the same time as informative as traditional learning [8, 9]. Educators record or prepare the teaching aids for asynchronous learning [10, 8, 3]. The recorded lessons are prepared for short duration as studies show that an estimated length of video lessons can be no more than 15-30 minutes [3, 16]. Preparation time for audio-video lessons are time consuming and moreover it also depends on the subject and the technological knowledge of the person [11, 12].

## Innovative Online Class Strategies

### *Teaching and Learning Experience*

Learning is an experience which involves many different contexts. Learning can occur individually, with peers, inside class, outside class, in small, large or adhoc groups. In order to have an active online learning, face-to-face teaching and learning inside classroom is just not enough [1, 16]. Instructors need to explore the software prior to the session and special attention is given to use up to date technologies. Training sessions are useful to get accustomed to new software's. Modules and activities are prepared in a more interactive [16].

Online studies bring a feel of remoteness [1]. So, in order to build the sense of community for students the first few sessions of class are dedicated for self-introduction and knowing other students. A self-introductory video of the instructor is uploaded [16]. Interested candidates are also given opportunity to introduce themselves with short videos [16]. Course structure, course plan, grading and assessment methods are introduced; explained through presentations or videos; students are brainstormed about the importance of taking the ownership and control of learning the course so that it will help them get equipped with lifelong learning skills and acquire digital literacy [16]. Students were asked to watch the video of simple topics. Towards the end of the course, students were able to comprehend almost all the topics by themselves and admitted that this approach had several benefits in self learning [16].

### *Course Support Materials*

Presentations are beneficial to a great extent in face-to-face traditional teaching but students may not find it attractive for online studies [1]. So video lessons of each topic is prepared and uploaded in the website [16]. Student response show that they prefer teacher prepared videos more effective for self-learning. Advantage of such video lessons are that students can listen any number of times and learn from these video lessons at their own pace [13-15]. Online sessions are basically used for knowledge checking. This approach facilitated independent learning which was revealed in the responses obtained from students at the end of the semester. However, students with language difficulties and technological issues were found lagging behind as they failed to follow the protocol of going through the prep materials in the website, prior to attending the class. Small groups were formed specially to take care of such students so that they feel free to discuss and clear doubts from their friendly peers at their own time [16]. It is mandatory to attend online classes. To make the online session easy and comfortable, students are guided to how to access the software, course lessons and activities. Special support centers are provided to students to tackle software and other online issues. Simulation exercises were introduced which was structured to be self-directed. To access such activities students must get registered and log in directly. Deadlines are kept and grades are assigned for such activities [16]. These activities have built-in teaching aids in the form of practise by watching video etc. This enabled students to watch the video lessons, understand and follow the instructions to solve the questions by themselves. Simulation exercises were also used to explain and solve practical questions. Generally, while practical assignments are given, students have issues related to having the same version/platform as per the course structure or may have other software related issues. Simulation exercises overcomes this problem as it provides everyone with the same working platform for the practical work.

These exercises are graded. Students were given more attempts so that they can improve their score. This practice made the learning less stressful and pleasant as they could score better grades with more attempts [16].

### Collection of Resource Materials

Preparing video lessons is time-consuming process for an instructor especially when it is prepared for the first time. Instructors take different time to develop, record and customize video lecture sessions. Some instructors prepared video lecture session-by-session while others prepared on weekly basis or lesson wise [16]. Minimum 1 to 2 hours is required to record a half an hour lecture session but once prepared, the same can be reused for other sections and semesters with little or no modifications. The preparatory work in the form of videos prepared by instructors is the only way for students to get the needed instructional content for their self-study. More and more new videos and activities are included in each semester. The videos are sometimes curated from other sources. Videos are prepared for each section by the instructor [16]. Videos from other sources are also incorporated. Materials uploaded and an estimate of time taken to create chapter-wise instructional video lessons for certain chapters of information technology is given in Table 1 where Lesson 1 content is on Hardware and Software, lesson 2 is about networking and mobile devices, lesson 3 is about security and maintenance and lesson 5 includes application software [16].

Lesson	Video sections	Creation time (hrs.)	Teaching materials
Lesson 1	5	15	Course book, Presentation slides, Video demonstrations, Assessment materials, software supporting practical activities
Lesson 2	3	10	
Lesson 3	3	8	
Lesson 4	10	35	

**Table 1:** Lesson, video parts (sections), estimated time in hours and learning aids.

In-class activities are designed to be collaborative in nature. In order to meet the objectives of AIC learning, peer communication was given importance for the following reasons: the social aspect of peer communication helps students get to know other students; making friends is important; when students are socially relaxed they are likely to learn more; some students have an easier time learning from peers than from instructors; learning from peers exposes students to different perspectives; and, teaching peers helps students clarify and solidify their own understanding of course concepts [16].

As part of building self-study habits and perform self-analyzation, activities are designed where students have to first watch audio or video lessons prior to solving the activities in the form of quizzes, test your knowledge etc. To make it comfortable for students, simulation activities with all the steps solved in the form of audio or video instructions are provided. These are self-work activities where students can first watch the video instructions and then practice. Peer help or instructor help is also provided in case of any difficulties. Assessments are conducted based on these audio-video lessons in the form of quizzes to check their level of understanding and self-study ability and was found that a very good number of students scored above average. It is found that assessment based on simulation exercises also helped students in promoting independent learning especially in online mode of teaching [16].

Team study activities are selected from the course handout's question bank. For a new batch, forming small groups of 5 to 6 students proved efficient. Larger groups or adhoc groups are formed for group study once students gets familiarized with each other. At least one session per week is reserved for team study which is given either in the form of do in class or do before class activities [16]. Table 2 shows the types of preparatory materials/resources and type of group formed to promote collaborative learning for some of the chapters in the introductory course.

<i>Chapter</i>	<i>Materials</i>	<i>Group size</i>	<i>Learning activities/size of group</i>
Lesson 1 to 3	Course book, PPT slides, videos, end of chapter quiz, check your understanding quiz, test your knowledge quiz, simulation exercise, oral questions, lesson handout activity.	Large	Handout activities, identify, complete the sentence, choose correct answer.
		Friendly group with 6 members	Handout activities, name the device, complete the sentence, match the following, MCQ.
		Adhoc groups	Handout activities, H5p questions, true/false.
Lesson 4	Simulation exercises, test your knowledge quizzes, output questions, peer questions.	Friendly group/pair/adhoc group	Handout activities, predict the output, explain steps to solve a given problem.

**Table 2:** Teaching materials, group size, and activities.

Responses about video lessons are:

- 'Able to study in free time'.
- 'Can watch n number of times and pause as and when required'.
- 'The video explanations of activities allow to do activities independently'.
- 'Online meetings at the time of study removes doubts'.
- 'Confidence to read, comprehend and solve problems'.

However, students pointed out few drawbacks of the system like 'Learning without teacher, peers and classroom is dull'. 'Feel boring watching video lessons without real teacher'. 'Network issues'.

To overcome the problems, video lessons were modified by including interactive sessions with teacher. Moodle H5p interactive videos were used. It helped students to great extend to remove the monotony of just watching videos. Short videos were prepared with many parts like part 1, 2, etc. depending upon the length of the lesson so that it's short and easy to download [12, 16].

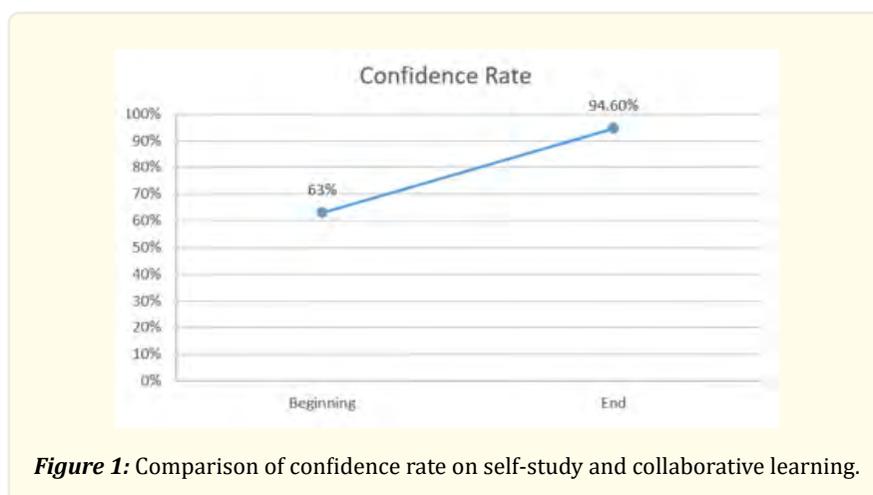
Review centers engaged students who needed more attention. Peer tutors or instructors took review sessions prior to any scheduled assessments. Instructors prepared the content materials for such sessions. This also lead way to students to gain confidence by being able to deliver and help peers and gain confidence in their use of computer skills [16].

## Results

In this paper, we compared the response obtained from students, at the beginning and at the end of the semester, on how confident students were with 'learning before the class and do activities in class' (LBC-AIC) and peer study. The class overall confidence rate at the beginning and at the end of the semester for taking the ownership of learning is shown in Figure 1.

The results show that the main objective of LBC-AIC approach to develop self and collaborative learning skills of students, is met. Satisfaction rate of 94.6% proves that this approach has helped student gain confidence by the end of the semester. It was noted that students were eagerly waiting for the lesson uploads so that they can go through it, prior to attending the class and prepare themselves for the online session.

Feedbacks mean value given by students on LBC/AIC approach is given in Table 3. The questions are based on the objectives of LBC. AIC learning and were on 5-point rating scale. Rating 5 was given for 'strongly agree'.



Questions	End of semester
LBC-AIC objectives are clear?	4.02
LBC video lessons and activities are useful for self-study?	4.56
Able to go through the video lessons prior to the class?	4.36
LBC promotes self-learning?	4.34
AIC helps peer interaction?	4.60
AIC strategy is better than traditional teaching methods?	3.59
Comfortable with AIC strategies?	3.54
Comfortable to study with any peer group?	4.01
Yes, I also learnt from peers which was as good an experience as to learn from a teacher?	4.78
Simulation exercises developed self-learning ability?	4.61
AIC approach helped me improve myself in self-learning, interacting with peers and helping peers?	4.47
I could help other students to understand the topics/questions?	3.20
I did peer tutoring and it helped me to build my confidence in self-learning and interacting with others?	3.84
LBC-AIC helped me get better grades?	4.07
Total	4.14

**Table 3:** Ratings by students on LBC/AIC objectives.

Results in Table 3 shows that students benefited with this approach. Teachers analysed the performance of the students on weekly basis by preparing an analysis chart.

Students were fearful about going through lessons without teacher and attempting activities at the beginning of the semester. However, Table 3 results show that by the end of the semester, students have met the objectives of online learning. The increase in the satisfaction rate is mainly due to the structured workflow which was well communicated and followed [16].

## Conclusions and Future Work

In this paper, we discuss teaching an introductory course for a group of students enrolled in an IT class for a particular semester. Course is designed to be taught using traditional lecture methods with hands-on activities but after the pandemic, transition to online mode took place [16]. The platform used was Moodle and online sessions were conducted using Zoom, BBB or MS Teams applications. In this introductory course, students learn about hardware, software, networking, mobile devices, security and maintenance, different application software's etc. Supplement course materials were added from other library add ins/additional resources and instructional sites [16]. Features in these software's were useful to bring control while doing activities as it allowed to specify the start date and deadline dates. Preparatory work, activities, quizzes and assessments followed in a specific order which progressed only after the completion of a particular skill and was graded [16].

We compared the responses obtained from students at the start and end of the course. The results display that the structured workflow strategies enabled students achieve the chief objectives of online learning [16].

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