# A Survey On The Effectiveness Of ICT & Cooperative Learning Methods For College Students

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## Abstract

**Purpose**: The availability of new educational technology spaces together with the introduction of new teaching and learning strategies. It changed the nature of the classroom from a place of instruction to one that produces authentic learning. 21-st century students are keen to learn with their peers, through the use of technology to produce information as a result of their collaboration. This research examines the effect of ICT based learning design and teaching concepts on undergraduate students' collaborative learning behavior in the ICT and cooperative learning classroom.

**Methodology**: This study used a quantitative survey research design to measure students' learning experience in the ICT based classroom. A set of online self-reported questionnaire was posted through the official Learning Management System of the college to collect data from 3200 undergraduate students in a karur region colleges. Through exploratory factor analysis, three factors were identified: (a) teaching concepts, (b) cooperative learning behavior and (c) ICT classroom. Pearson's correlation and multiple regressions were run to assess the relationship between ICT based learning and teaching concepts conducted by the lecturers on the cooperative learning behavior of the students.

**Findings**: The results from the multiple regression analysis revealed that both (i) teaching concepts and (ii) ICT based classroom were positively correlated with cooperative learning behavior of the students. The results from Person's correlation showed a significant, strong and positive relationship between teaching concepts conducted by the lecturers on the cooperative learning behavior among the students.

**Keywords:** ICT based Classroom, Cooperative Learning, and Teaching Concepts

## INTRODUCTION

Information and Communication Technology tools can be used to enhance the Co-operative learning environment. Co-operative learning is the most suitable method not only in school education but also in higher education and research. Particularly, in computer studies, co-operation from the members of the group is the most vital part to complete the project works. Co-operation is working towards the same goal. In other words, working together to complete a task. Each member can contribute in a different way. For example, a software developer can work for the development of coding. A software tester can work for the testing the software functionality and usability, etc. In the co-operative learning environment, the educator has the facilitator role than contributor role. New Information and communication technology tools should be used and it should be applied in the teaching and learning process to improve the student's performance and facilitate the learning experience.

Traditional classroom environment is competitive most of the time, students work independently, and they are continually in competition with one another for grades, praise and recognition. Such competition does have some negative effects. Even high achievers may not achieve their best because they know that they will be near the top anyway. Further, the competition for grades and recognition may set up a pecking order in the classroom, with high performing students at the top (Ames et al., 1977). This process further alienates low-performing students, who may turn to delinquency or withdrawal as a means of maintaining positive self-esteem in the face of what they perceive as a hostile school environment.

An alternative to traditional competitive classroom is Co-operative learning. Co-operative learning is the learning process in which individuals learn in a small group with the help of each other. Co-operative learning gives importance to cooperation as against our present educational system, which is based on competition. Co-operation as a human characteristic has been seen until fairly recent years as the relative absence of competition. The more competition in a person, necessarily then, by logical and biological argument, there is less cooperation in the person. Notable resistance to the idea of mutual exclusiveness of cooperation and competition came from Margaret Mead, who, at the level of total culture, was able to show that a human society is a functional blend of both co-operation and competition. As with all such blends, the balance between the two varies from one culture to another (some cultures being markedly Co-operative and some markedly competitive). This coexistence does not necessarily diminish the cohesion nor reduce continuance of the culture.

**REVIEW OF LITERATURE**

According to Toby "the educators need to give guidelines and proper instructions regarding the group members' specific role". According to him, "Group performance depends upon the proper communication and proper contributions of each member in a particular group". He used the terms such as 'social cohesion', 'interpersonal skills', 'motivation' and 'interaction' to attain the goal. According to Giraud (1997), "Co-operative learning groups provide a facility for peer learning". In the co-operative learning environment, the learners who lack specific skills, aptitude and knowledge can get the needed skills from another member of the groups having different skills. According to Marcela 'collaborative learning is a useful strategy in teaching practical project works. Discussion about a lecture by a group of students from the same college or different by using ICT tools is a good example for collaborative learning. In well-constructed Co-operative learning strategy, students work together in groups to complete a task. Each member of the groups has equal opportunity and has a well-defined role to work.

According to Johnson, there are three types of Co-operative learning groups exist. They are formal Co-operative learning groups, informal Co-operative learning groups, and Co-operative base groups. Formal Co-operative learning groups exist from one period to several weeks. They are formed to accomplish a specific task. Informal Co-operative learning groups exist from a few minutes to a period. It is useful to focus a particular topic during the learning hours. Co-operative base groups are long-term groups. At least it exists to one year. Stable and permanent members are the base of Co-operative base groups. Theses members give support, help, encouragement, and assistance to attain the project
objectives and goals.

According to Olsen and Kagan (1994) positive interdependence and group, theformationare the main factors for the success of Co-operative learning. Positive interdependence develops when the members support mutually in a positive way. Group's formation is an important factor in Co-operative environments. Group formation starts when the teacher decides the size of the group and fix the tasks to complete and also the time limits for the project work and lesson plan.

Groups are formed according to the teachers' selection of the members or according to the student's willingness. But teachers are able to select the heterogeneous nature of group members. For example, student's with good academic background, skills, knowledge, sex, ethnicity, etc, can be grouped together to complete a lesson and a task. Sometimes students' are allowed to form a group according to their willingness. The Samemindset to complete the task can create a cohesiveness in their group. [4]. According to Elmore (1996), "majority of teaching methods relies on teacher control in which student has no power to group together to solve a problem. It is because of the teacher-directed learning environment.

Slavin (1995) stated that Co-operative learning provides opportunities to explore, examine and creativity which is useful to apply the knowledge, skills to solve the problems by themselves with the help of group members. Joyce (1997) stated that "some students have no practice in group learning due to the lack of teachers' direction. Machemer and Crawford (2007) favor the concept of Co-operative learning than active learning. Doing works with others creates the active learning

environment. Student-centered learning can be achieved through active engagement and cooperation among the students.

According to Menges (1994), "there are changes need to be implemented in order to improve the teaching and learning process. They are

- Changes to group teaching
- Changes to Co-operative learning environment
- Changes to teacher centered to learner-centered
- Changes to improve the low-level IQ students
- Teaching different things to different students
- Changes to more engaged learners

## CO-OPERATIVE LEARNING

ICT technology such as Audio-Video Medium like MS – Power Point, 2D animation Flash, 3D Animation Maya, Adobe Photoshop, Computer graphics, and Internetworks facilitate the communication process. Cooperation develops only when a smooth communication process flows between the sender and the receiver. Mainly the psychological barriers such as ego, fear, prestige, mind-sets, cognition, and etc., can be broken by the ICT usage in Co-operative learning. Because anyone can send and receive information at anytime and anywhere. Use of smart phones makes the communication very flexible and friendly than face to face communication. Usage of smartphones during the traveling time, working hours and leisure hours are very common. This mobile using tendency makes the learning process very simple. But there is a digital divide exists between the developed countries, developing countries, and underdeveloped countries. There are many research evidence are available to strengthen the fact. Research works such as 'TERI" suggests the usage of ICT tools for effective learning among the school students.

According to Branson (1991), "students learn from their peer groups by interacting with other members and not only from the teacher". By using the ICT technology the learner learns much more than the classroom activities from their peer groups.

## COMPUTER STUDIES USING ICT TOOLS

Computer science subjects such as C Programming Language, Advanced JAVA Programming, Database Management System, Big data application, Machine Learning, Python Language, software testing, software engineering, and development, etc. need a Co-operative learning environment. Creating a group among the technically diverse group members with various skills such as coding skills, software testing skills, project planning skills, etc. is not a simple task. Getting cooperation among the members is also not a simple and easy task. Group works' success depends upon the contribution of its every member's willingness and work. Motivated group members with positive interdependence can do wonderful project works in the Cooperative learning environment. The interaction between the group members is simplified due to the use of ICT tools such as Google search engine, Youtube, Whatsapp, Twitter, Facebook, Google Meet,

Hangouts, LinkedIn, etc. Group members can share their new insights and creative ideas within a fraction of seconds with other members of their groups.



Figure 1: Different Types of Activities in ICT & Co-operative learning

## CO-OPERATIVE LEARNING FRAMEWORK



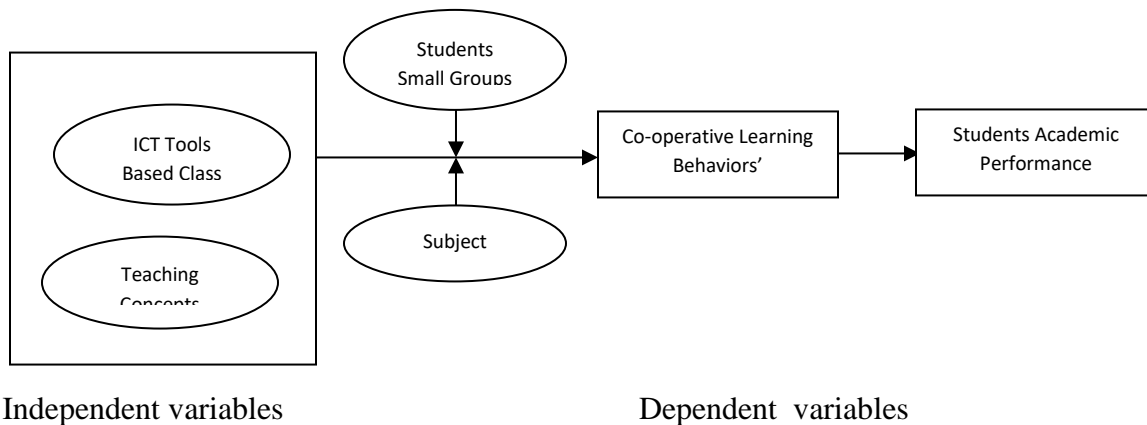Independent variables                                    Dependent variables

**Figure 2: Co-operative learning framework**

The co-operative learning framework of this study is shown in Figure 1. It identifies the ICT Tools based classroom design and Teaching concepts as independent variables and Co-operative Learning Behaviors as the dependent variable. It also investigates the effects of students' small groups (male or female and both students' small groups) and subject study as the moderators.

## METHODOLOGY

The overarching research question guiding this study is to examine the effects of ICT tools-based learning design and teaching concepts on students' cooperative learning behavior in the ICT tools-based classroom. The following research questions are examined in this study:

1. What are the dimensions of the e-learning experience in cooperative learning?
2. To what extent do teaching concepts influence students' cooperative learning behaviors?
3. To what extent does e-learning affects students' cooperative learning behaviors' in the ICT tools-based classroom?
4. What are the effects of students' student small group and subject study on their co-operative learning behaviors?

## DATA COLLECTION

In this part, we present the dataset and detail the characteristics that were retrieved from it. After that, the distribution of data is discussed in detail. The information comes from a course named 'CS as well as BCA BDU Core papers', which ran from 2017 to 2020 and was taught in English. 3250 students took part in this study in total.

## QUESTIONNAIRE

The questionnaire aims to identify the effectiveness of various ICT tools and new educational technologies, the preferred learning methods of students, and other factors that might influence the teaching–learning process. Questions 1-4 are used to understand the student's learning style. Questions 5–7 are posed to find out the effectiveness of the cooperative learning methods used for teaching and evaluation. Questions 8-12 are framed to identify various barriers to student-based learning.

## RESULT AND ANALYSIS

This paper presents the cooperative learning, methods, and a survey on the innovative practices in ICT based teaching and learning. Various components on the effective use of ICT tools, team-based cooperative learning, and ICT-based learning are discussed in detail. The outcome of a survey on the effectiveness of ICT tools based teaching and learning is included. The following sections present the co-operative learning methods, the details of the questionnaire used for the survey, and the outcome of the survey.

**Table 1: The Subject-wise respondents.**

| S. No | Subject Name | Respondents |
|-------|-------------|-------------|
| 01. | Java Programming | 258 |
| 02. | Big-Data Analytical | 150 |
| 03. | Machine Learning | 098 |
| 04. | R Programming with Lab | 085 |
| 05. | Other Subjects | 79 |

Table 1 &Figure 3 shows the subject-wise respondents. It is shown that 258 students belong to Java Programming. 150 respondents belong to big data analytical, 98 students belong to Machine

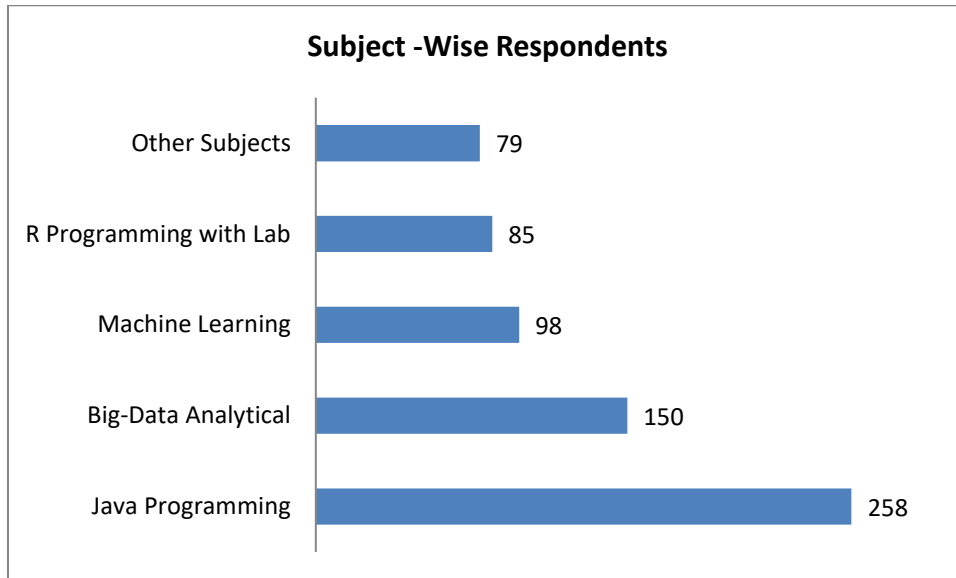learning, 85 students belong to R programming with Lab. 79 students belong to other computer science subjects.

**Subject -Wise Respondents**

| | |
|---|---|
| Other Subjects | 79 |
| R Programming with Lab | 85 |
| Machine Learning | 98 |
| Big-Data Analytical | 150 |
| Java Programming | 258 |

**Figure 3: Students respondents with Subject-Wise**

Figure 4 shows the devices used by students for ICT-based learning. 34.20% of students are using notebook/desktop and 8.40% of students are using tablets. Many of 53% of students are using Smartphone's and very few of 4.40% of students are using other electronic devices.
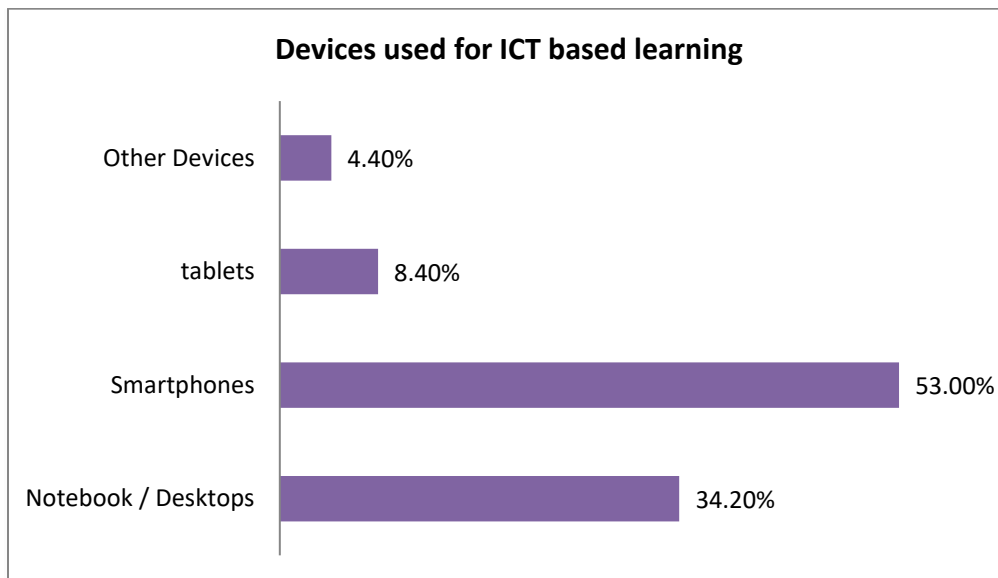
**Devices used for ICT based learning**

| | |
|---|---|
| Other Devices | 4.40% |
| tablets | 8.40% |
| Smartphones | 53.00% |
| Notebook / Desktops | 34.20% |

**Figure 4: Devices used for ICT based learning**

Figure 5 show the engagement in ICT tools based learning and cooperative learning. The 46% of students are engaging in small groups (2-5 students) and very few of the 4% students are engaging

in large groups (more than 10 students). 26% of students are engaging in an individual assignment. Finally, 23% of students are engaging ICT based learning.
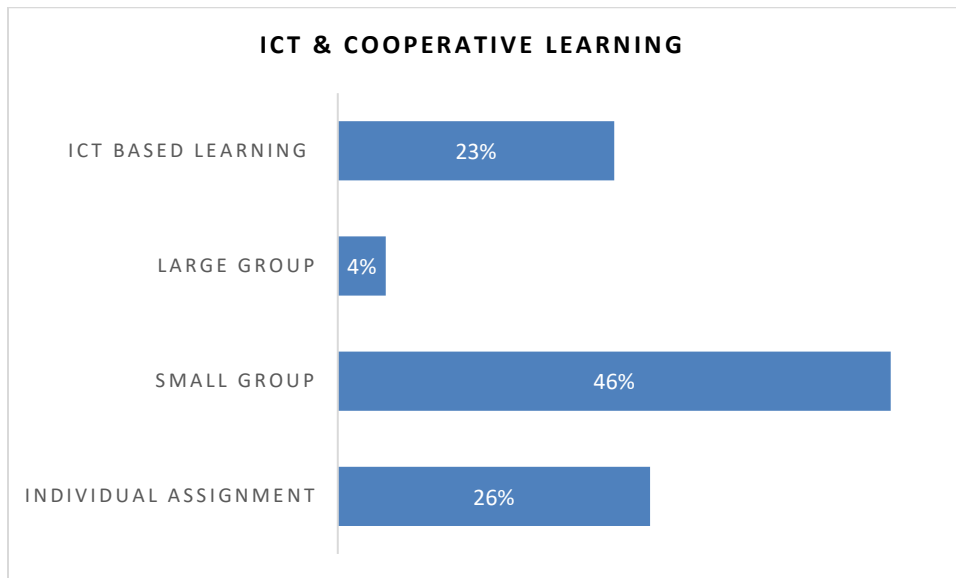


**Figure 5: ICT & Co-operative learning engagement**

The cooperative learning experience of students is shown in Fig. 6. The majority of students have said that they can learn them comfortably through ICT-based and cooperative learning.
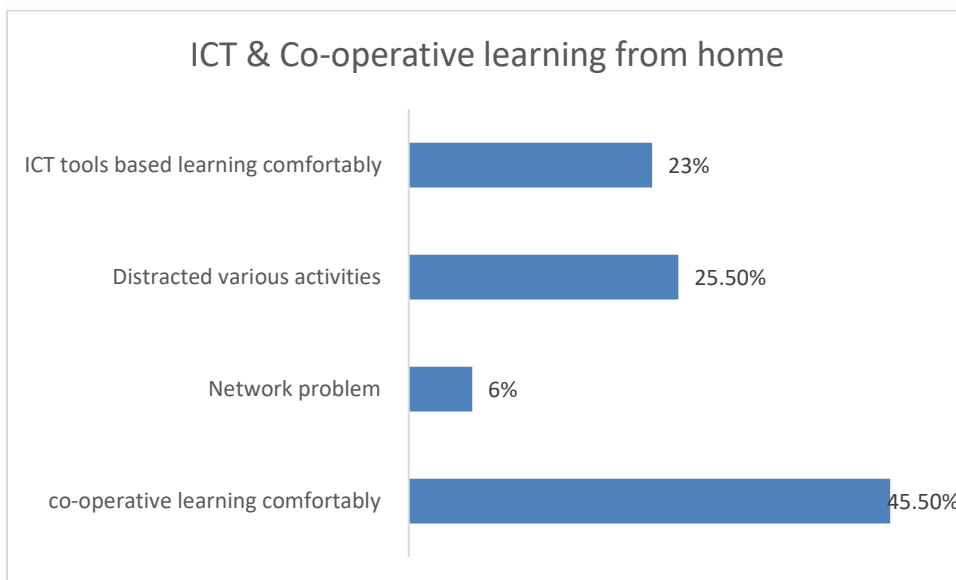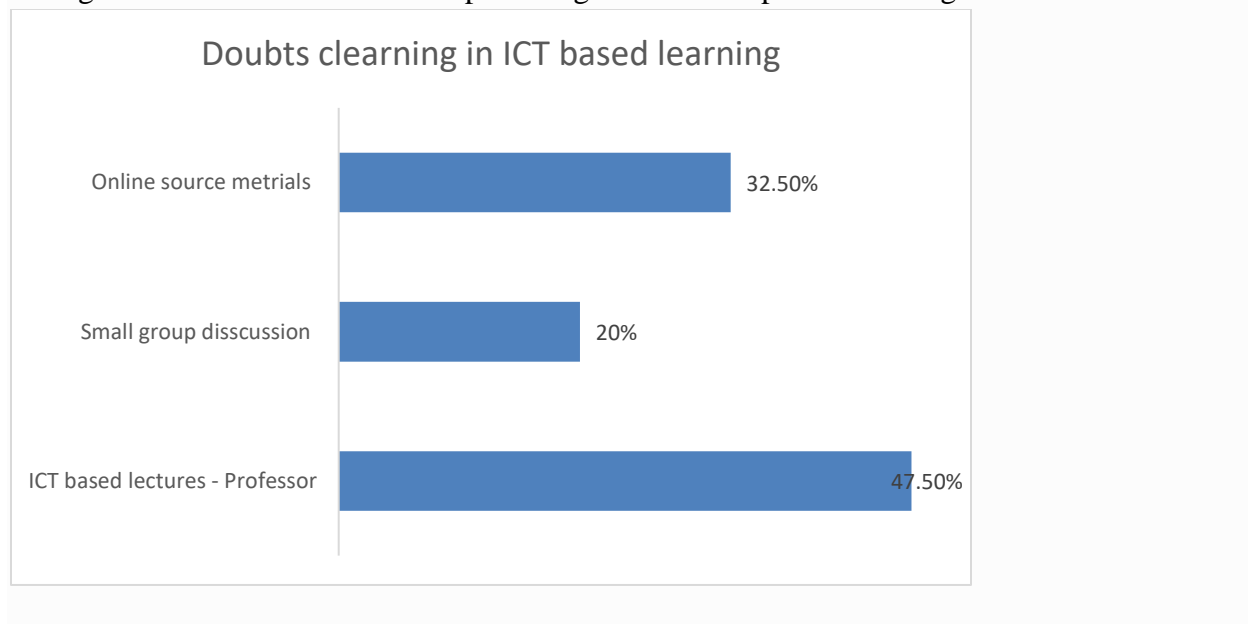


**Figure 6: ICT & co-operative learning from home**

Figure 7 shows the methods adopted for clearing doubts in cooperative learning. 43.2% of the respondents ask the Professor and get their doubts clarified during ICT based lectures. 25.5% of

them post queries in the small group discussion forum and help from peers. 31.3% of them go through the online source materials providing additional explanation and get their doubts clarified.

## Doubts clearning in ICT based learning

| Category | Percentage |
|---|---|
| Online source metrials | 32.50% |
| Small group disscussion | 20% |
| ICT based lectures - Professor | 47.50% |

**CONCLUSION**

The formal formation, informal group formation, and base group formation are important strategies in computer education in order to facilitate the group attitude among the media learners. Educators must use ICT tools in their teaching process. Various software ICT education tools are available in the IT industry for educators. Educators need to get the proper training from software vendors to excel in the field of teaching. Due to media convergence, educators are expected to acquire new digital literacy skills Online course learning is one of the best ways to understand digital media and use it.

The application of ICT tools improves flexibility in the cooperative learning environment. In addition, it helps educators form groups, inform groups and evaluate groups at any time. Group members can also communicate easily through ICT tools to work effectively towards their tasks. Educators must include concepts such as cooperative learning, collaborative learning, and ICT4 (information technology and education for education). This review article concludes that ICT tools are very useful for training computer science students. ICT tool would help the communication process among the students and the trainers in the Cooperative learning environment.

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**Annexure – I**

**Questionnaires**

[1]. Which of the following **devices do you use** for your online learning?
   a. A laptop/desktop computer
   b. A tablet
   c. Smartphone's
   d. Other devices

[2]. Which of the methods engage you personally **to learn digitally**?
   a. Individual assignment
   b. Small group (No. 5 students) work
   c. Large group (No. 10 students and more) work
   d. Project-based learning

[3]. Which of the **digital collaborations** enables you to work on a specific task at ease?
   a. Two by two (2 member team)
   b. Small group workgroup (No. 5 students) work
   c. Large group (No. 10 students and more) work

[4]. Which of the **digital approaches** motivate you to learn
   a. Animations
   b. Whiteboard and pen
   c. PowerPoint presentation
   d. Digital pen and slate

[5]. My experience with online learning **from home** digitally
   a. I am learning at my own pace comfortably
   b. My situational challenges are not suitable
   c. I can learn better with uninterrupted network connectivity
   d. I am distracted with various activities at home, viz. TV, chatting, etc.

[6]. Which type of recorded video lecture is more **effective for learning**?
   a. delivered by my faculty
   b. delivered by NPTEL
   c. delivered by reputed Overseas Universities
   d. delivered by unknown experts

[7]. Which type of quiz is more **effective for testing** the understanding?
   a. Traditional—pen and paper—MCQ
   b. Traditional—pen and paper—short answers
   c. Online quiz—MCQ
   d. Online quiz—short answers

[8]. Student version **software downloaded** from the internet is useful for learning
  a. True
  b. False
  c. Unable to decide

[9]. **Online teaching–learning takes place effectively** because:
  a. Every student can hear the lecture clearly
  b. PPTs are available right in front of every student
  c. Students can ask doubts without much reservation
  d. Students need not walk long distances before reaching the class

[10].     Which of the following statements is true of **online learning off-campus**?
  a. No one disturbs me during my online learning.
  b. My friend/family member/roommate/neighbor occasionally disturb me
  c. My friend/family member/roommate/neighbor constantly disturb me

[11].     At home/place of residence, how many **responsibilities** do you have?
  a. I don't have many responsibilities.
  b. I have a moderate amount of responsibilities, but I have sufficient time for online learning.
  c. I have many responsibilities; I don't have any time left for online learning.

[12].     What is your most **preferred method for clearing doubts** in online learning?
  a. Ask the professor during/after an online lecture
  b. Post the query in a discussion forum of your class and get help from your peers
  c. Go through online material providing an additional explanation.