# Introduction to Statistical Analysis

## A REPORT ON

## MOOC: INTRODUCTION TO STATISTICAL ANALYSIS

### Cycle I: 01 May 2021 to 10 June 2021

## Offered Jointly by Commonwealth Education Media Centre for Asia (CEMCA), New Delhi
## &
## Kalinga Institute of Social Science, Deemed to be University, Bhubaneswar

### Introduction

Statistics and statistical knowledge is very important for learning from data. In today's world application of statistics and its findings are crucial for policy decisions at all levels. It's about making decisions and predictions based on satirical results/findings. In all disciplines of social science and social science in general and teacher education we use statistics in research and development. It gives answer the question why statistics and statistical analysis is important in the modern society. It helps us to create new knowledge. The present Massive Online Open Course (MOOC) on Introduction to Statistical Analysis aimed to expose the learners to the fundamental dimensions of statistical analysis and its practical applications in various fields of studies. The main objectives were to allow the learners to understand and

apply the concept in the field of their work for their professional development. So as to say it was for professional development and competency enhancement of working professionals associated with field work, research, and impact & feedback studies in various fields of social sciences in general and teacher education in particular. At the same time the course was intended for Under Graduate/Post Graduate students for their dissertation/project work and Ph.D. scholars for their research study.

## Objectives

The important objectives of this course were:

1. To help learners understand the concept of statistical inference and their applications
2. To equip learners with essential skills to enable them to use the concept in their field of study.
3. To build confidence in learners to use the statistics for verification of hypothesis effectively and efficiently.
4. To develop analytical ability of learners in selection of statistics and their use in research study.
5. To help the learners to expose with the field based problems/issues and come out with possible solutions

## Target Group

This course was designed for anyone interested in understanding and developing insights to use statistical techniques. However, it was aimed at teachers, students and research scholars from various disciplines of higher education in general and teacher education institutions in particular including school teachers, educational leaders as well. Working professionals (early-career and mid-career) of Government and Non-Government organizations working with various projects of social development (education, health & family welfare, rural development, panchyatiraj, agriculture and animal husbandry, urban development etc., were also targeted.

## Duration of the Course

The duration of the course was Four Weeks, starting from $1^{st}$ May 2021 to $28^{th}$ May 2021. However, based on the requests of learners and decision of the course team it was extended till $10^{th}$ June 2021.

## Course Outline/Structure

Course comprised of four modules as per the details given below

| Week | Module | Theme | Sub themes |
|---|---|---|---|
| 1 | I | Introduction to Statistical Inference | What is statistics, descriptive statistics, inferential statistics, sample, population, statistical inferences, census inquiry, sample inquiry, Statistics, parameters, estimation paramenters, chance of variation, sampling distribution, features of sampling distribution, normal distribution, characteristics of normal |

| | | | distribution, examples & illustrations and reflection questions |
|---|---|---|---|
| 2 | II | Significance of Mean | Large sample, Assessment of significance of mean of large sample, test of significance of means from standard error of mean, applications of significance of mean of large sample, significance of mean of small sample, t-distribution, degree of freedom, examples & illustrations and reflection questions |
| 3 | III | Testing the Hypothesis | Statistical hypothesis and its testing, level of significance, degree of confidence, critical value, Types of error- Type I & Type II errors, Types of test- one tailed & two tailed test, examples & illustrations and reflection questions |
| 4 | IV | Difference between two Means | Difference between two Means, steps of calculation, Difference between two means of independent samples, difference between two correlated means, examples & illustrations and reflection questions |

## Instructional Design & Implementation

*Four quadrant approach of MOOC such as; i) e-text, ii) video, iii) forum, iv) hangout, v) resources, v) quiz and assignment for evaluation were used to make the course interactive and participatory.* At the same time, content of each week and guidance for assignment preparation was supported by a live sessions.

### i) e-Text & Video

| Module I | Introduction to Statistical Inferences (e-text) |
|---|---|
| | Video<br> Introduction to Statistical Inferences (7.52 Mins)<br> Normal Distribution (12.03 Mins) |
| Module II | Significance of Mean |
| | Video<br>Significance of Mean of Large Sample (10.02 Mins)<br>Applications of Significance of Mean of Large Samples (16.24Mins)<br>Significance of Means of Small Samples (11.44 Mins) |
| Module III | Testing the Hypothesis |
| | Video<br>Testing a Statistical Hypothesis (12.52 Mins)<br>Types of Errors & Types of Tests (19.32 Mins) |
| Module IV | Difference between two Means |
| | Video: Difference between Two Statistics (15.05 Mins)<br>Difference between Two independent Means (20.55 Mins)<br>Difference between Two Correlated Means (19.44 Mins) |

### ii) Additional Resources

Additional resource materials (video and e-tests) relevant to the theme of the module and themes of each week were provided to learners in the resource page on week to week basis. It's an attempt to allow the learners to explore more about the course depending upon their need and expectations.

**iii) Reflection questions** were given at the end of each module to motivate the learners to focus and concentrate and involve in on practice of practical based questing. It's like brain storming questions which would help them to explore more.

**iv)Evaluation**

Provision of evaluation was made through Quiz in each week. There were four Quizzes in the whole course with 10 questions in each quiz. Care was taken to have quiz questions on all aspects such as knowledge, understanding, application and skill. Conscious decision was taken to have more application and skill based questions to make the learners apply and assess their own ability, to make it a point of self evaluation as well. **The average score is found to be 88,** which is found to be very good in such a MOOC involving mathematical ability, analytical ability and research base for strengthen the foundation of learners from multiple field of study.

**v) Live Sessions: For Blending**

The following four Live sessions are planned and scheduled for providing better support services to learners and resolving queries of learner onsite by the lead instructor Dr Manoj Kumar Dash with the support of Dr Manas Ranjan Panigrahi and all mentors.
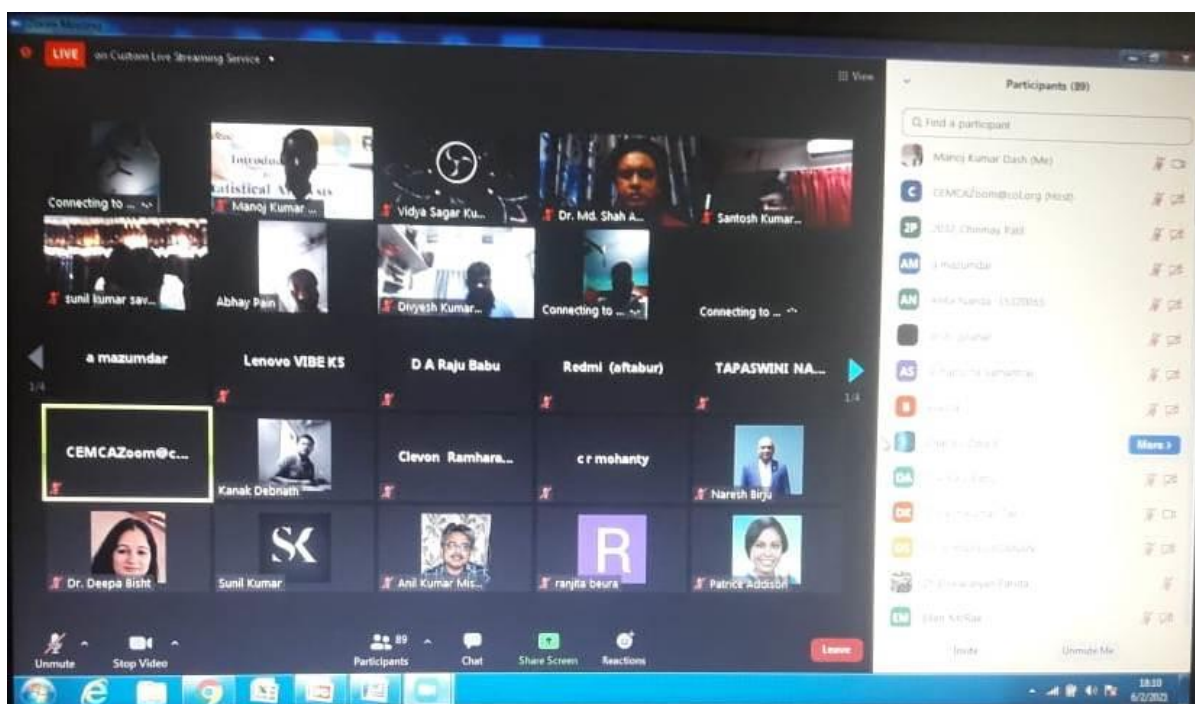


| Sl. No. | Theme | Date | Recording (URL) |
|---|---|---|---|
| 1 | Assignment Preparation and Question Answer | 23rd May 2021 | https://youtu.be/KLeOppQULac |
| 2 | Reflection Question I & II and Q &A | 25th May 2021 | https://youtu.be/KLeOppQULac |

| 3 | Reflection Questions III & IV and Q & A | 30th May 2021 | https://youtu.be/BRheKOkxkFA |
|---|---|---|---|
| 4 | ASSIGNMENT GUIDE and Q & A | 2nd June 2021 | https://youtu.be/eDYzxpBKt94 |

This was an attempt to implement the programme with blended mode. The sessions were found to be very relevant and helpful for the learners and were highly appreciated by learners, as posted in the forum **(Annexed as Annexure I)**
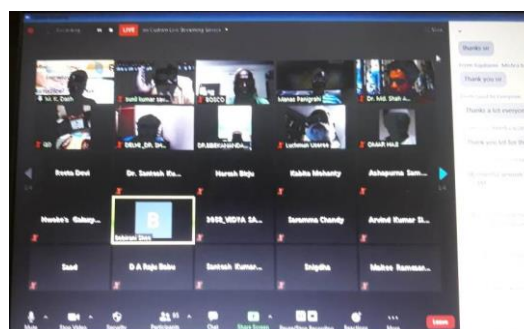


## Learning Outcomes

Learners successfully completed the MOOC can
1. Define the concept of statistical analysis and distinguish between statistical analysis and statistical inferences.
2. Use various statistical measures and their use in analysis and interpretation in their research.
3. Develop essential skills to understand concept of the level of confidence interval and their use in making analysis and interpretation in research.
4. Use the statistics effectively and efficiently for verification of hypothesis of their research study meaningfully.
5. Develop analytical ability and critical thinking in selection of statistics and their use in making interpretation meaningful and productive

## Course Team Meeting

The course team comprised of course design & development team, Principal instructor, Mentors and members of operation team. Series of meetings (virtual) are held from time to time with all the members of course team at each phase of development and finalising the instructional design and implementation strategies for this MOOC.

## Launch of the MOOC

The course was launched on 30th April 2021. In this occasion Prof Madhu Parhar Director, CEMCA; Prof K. B. Das, Pro Vice Chancellor, Central University of Odisha & Chairperson, Eastern Regional Committee, NCTE; Prof Deepak Kumar Behera, Vice Chancellor, KISS

University addressed to the virtual gathering. Dr. Manas Ranjan Panigrahi, CEMCA gave a brief introduction to the MOOC, status of enrolment of learners in the course and basic parameters of implementation. Dr. Manoj Kumar Dash, Regional Director, IGNOU & principal instructor of the MOOC presented the course outlines, explained the structure of implementation of the programme (instructional design). Dr. Sumeet one of the mentors of this course facilitated as and host the event. The detailed about the proceeding of the launch of the course is made available at **https://www.youtube.com/watch?v=x1MHDMTdKFo**



| PROGRAMME SCHEDULE LAUNCH OF THE MOOC | |
|---|---|
| 15:30-15:35 | **Welcome to Guests & Participants**<br>*Dr Sumeet* |
| 15:35-15:45 | **Introduction to the Programme& Background of this MOOC**<br>*Dr Manas Ranjan Panigrahi, Sr Programme Officer, CEMCA* |
| 15:45-15:55 | **About the MOOC on Introduction to Statistical Analysis (ISA)**<br>*Dr Manoj Kumar Dash, Instructor, ISA MOOC* |
| 15:55-16:05 | **Address by the Director, CEMCA**<br>*Prof Madhu Parhar* |
| 16:05-16:15 | **Address by Pro Vice Chancellor, Central University of Odisha**<br>*Prof K. B. Das* |
| 16:15-16:25 | **Address by the Vice Chancellor, KISS University**<br>*Prof Deepak Kumar Behera* |
| 16:25-16:30 | **Vote of Thanks**<br>*Dr Prashant Kumar Routray, Registrar KISS University* |

*ISA MOOC TEAM*

## Course Design and Development Team

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**Mentors**

1. Prof Mostafa Azad Kamal, BOU, Bangaladesh
2. Dr. S. K. Panigrahi, IGNOU, RC Bhubaneswar
3. Dr Sumeet, New Delhi
4. Mr Kuldeep Sharma, Jaipur, Rajasthan
5. Ms S. R. Dash, Bhubaneswar, Odisha

**Operation Team**

1. Dr Manas Ranjan Panigrahi, Sr Programme Officer, CEMCA, New Delhi
2. Dr Monica Nagpal, CEMCA, New Delhi
3. Dr Prasanta Kumar Routroy, Registrar & CEO, KISS, Bhubaneswar
4. Dr Iswar Chandra Naik, Dean, KISS, Bhubaneswar

**FINDINGS OF THE COURS**

*Enrolment in the Course*

Total Registered learners: **4662** (3351 from India & 1311 from other countries) from **52 different countries.** Out of 3351 registration from India, highest number of registration i.e, **1331** are from one state Odisha only.

53.7% registered learners are male and 46.4% are female. It reflects the quantum of registration all around the globe, shows the interest and motivation of learners towards this MOOC ISA.

## Gender



Highest number of registered learners, i,e 26.7% are in the age group 21-25 yrs, 17.9% in 26-30 yrs, 13.7% in 31-35yrs, 11.5% in 36-40 yrs, 9.9% in 41-45yrs, 6.1% in 46-50yrs and 5.9% are above 50 yrs.

## Age Group
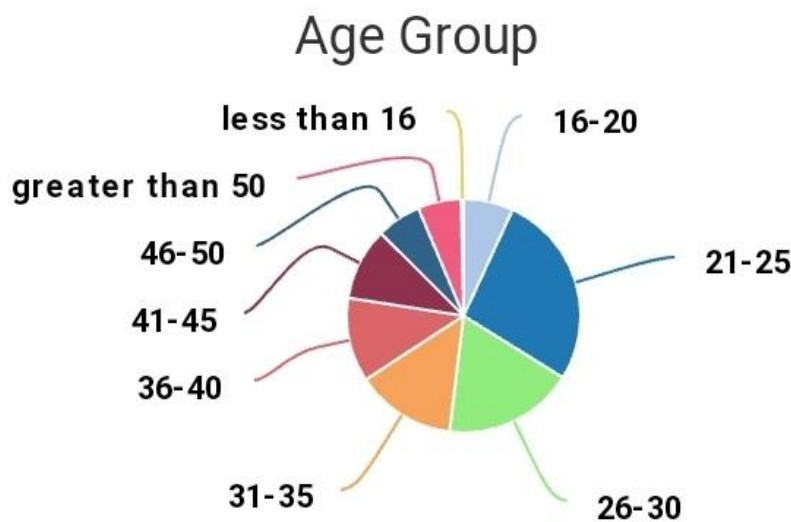


This shows the increasing trend among the youth towards use of technology and learning through technology in the present age of digitization.

Out of all registered learners 50.4% are post graduates, 23.5% are under graduates, 2.4% are from pre university level, 2.6% are with high school qualification and 4.2% are with other qualifications. This reflects the length and breadth of the level of knowledge and understanding of the registered learners of this course.

## Qualification
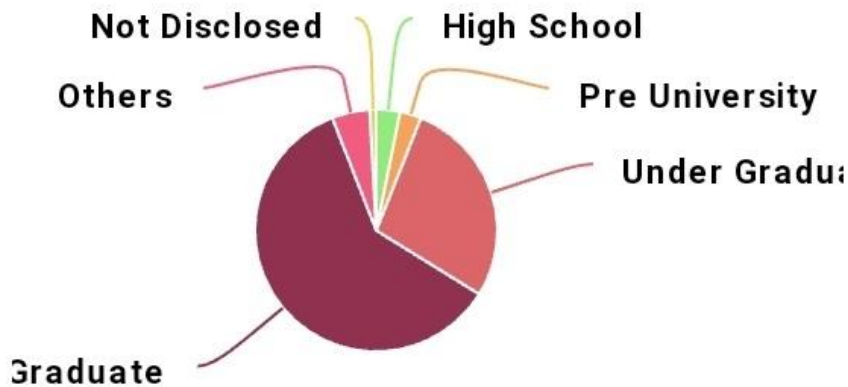


With respect to the affiliation of registered learners, it is also pertinent to mention that 36.8% are academia, 19.1 from government sectors, 37.9% are with individual recognition, 3.4% are from non-profit organization, 1.1% is from profit organization and 1.1% is from community organization. We can say that the registered learners are from all fields and discipline not just limited to any particular field/discipline.

## Affiliation
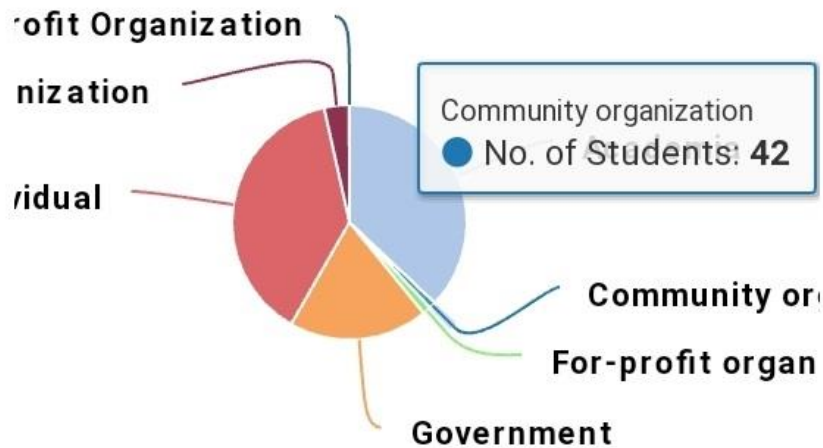


*Discussion and Interaction*

Out of **4660 registered learners,** 66.39**% are active learners**. It is encouraging to note that **3240 forum posts** in the curse as on 10th June 2021. Where, **12662 comments are posted** by the learners from time to time during the implementation period.  There are communication and interaction made in hangout to provide instant solution to their queries.

**3240** Forum Posts

**12662** Comments Posted
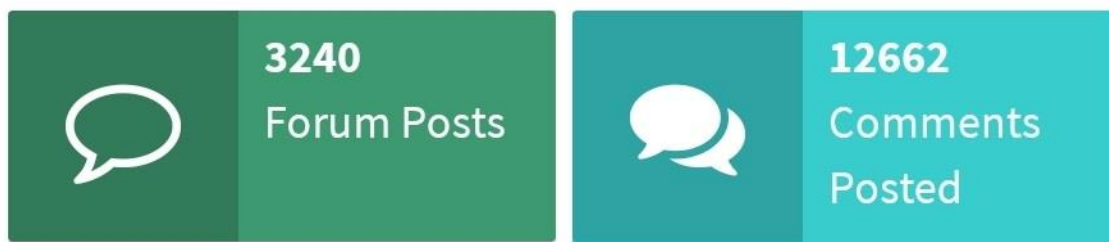
It was a great learning experience; interacting with such a large number of learners from around the globe The comments made by the learners are quite encouraging and motivating to have similar experiences for the cause of learning of learners at a distance through online MOOC.

## Certification

On the basis of the evaluation criteria finalized by the course team, 791 Certificates are issued to eligible learners who successfully participated and completed the course.
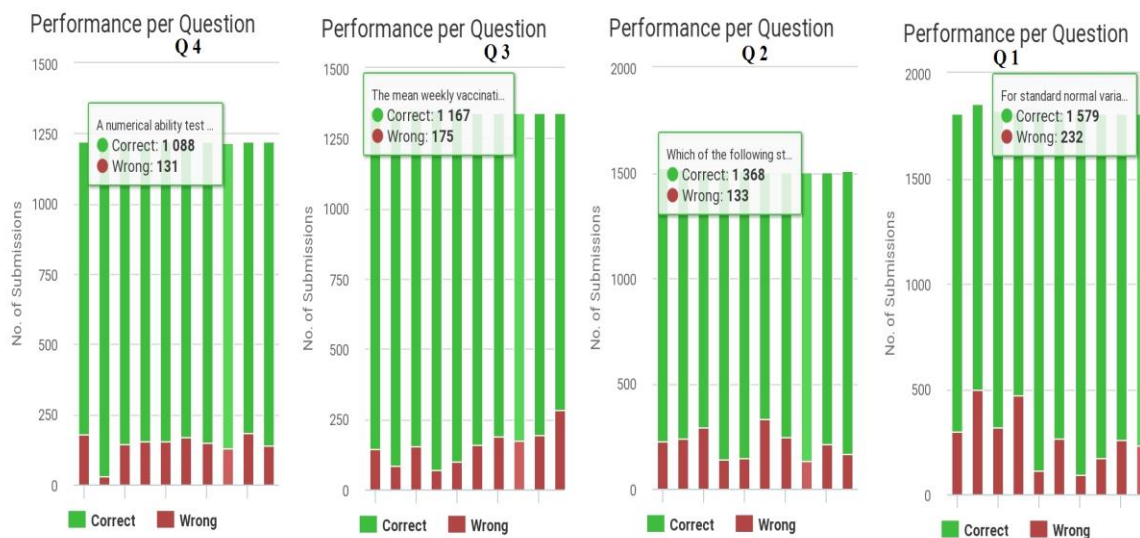
i) **426** Certificate of Completion
ii) **356** Certificate of Participation

### Results of Quizzes
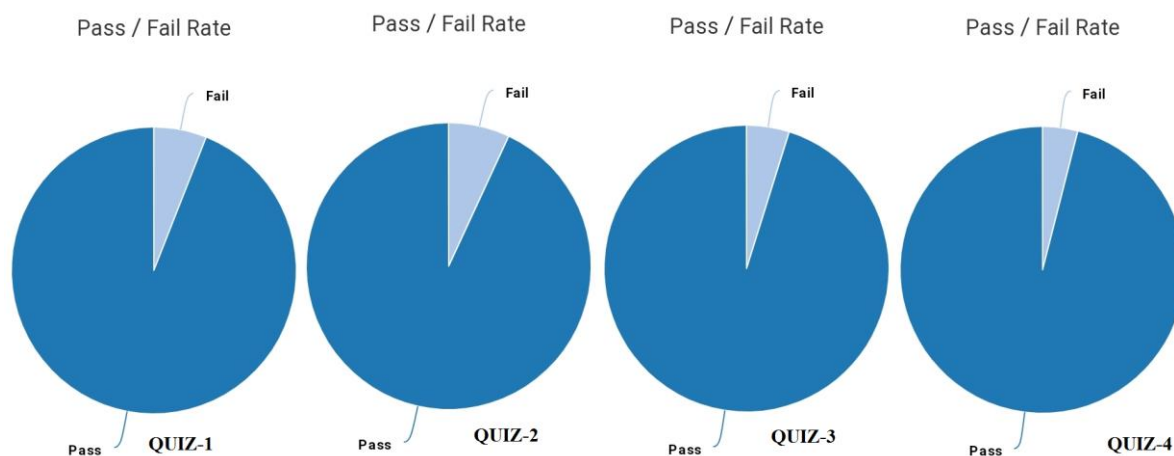


### Question Wise Performance

In each quiz there were 10 questions. Question wise performance o the learners is summarised for better understanding and clarity about the nature of questions.

Performance per Question Q4 — A numerical ability test ... Correct: **1 088** / Wrong: **131**

Performance per Question Q3 — The mean weekly vaccinati... Correct: **1 167** / Wrong: **175**

Performance per Question Q2 — Which of the following st... Correct: **1 368** / Wrong: **133**

Performance per Question Q1 — For standard normal varia... Correct: **1 579** / Wrong: **232**

## Recommendations

The following points are submitted for kind consideration of CEMCA and the implementing partner KISS

**For CEMCA**

1. Similar MOOCs based on course content of UG, PG, M.Phil level should be planned and implemented for providing add-on support to students and also faculties of various disciplines

2. In the platform of MOOKIT, a provision be made to have separate page for the posts of Instructors and learners. So that, learners involvement, participation, response to the instructors posts can be assessed conveniently and also it can be made as a point of assessment and providing reminders to them

3. In the platform of MOOKIT, a provision be made to delete the posts of learners, if found irrelevant by the instructors. It would encourage them to post only relevant and significant content in the forum.

4.  In the platform of MOOKIT, a provision be made to facilitate/motivate/remind individual learners, based on the quality of response made to posts.

5. Zero weeks should be made more systematic and structured like the other weeks to make the learners completely orient about the use of the platform and understanding of various mandatory requirements of the course.

6. Provision of sending sms be mad in the platform/ or through other means to learners for each announcement.

**For KISS (Partner Institution)**

1. MOOC brouchers and other promotional materials may be uploaded in the website well in advance followed by wider circulation in all social media network.
2. Press Meet may have been planned for launch of the course in all cycle for wider dissemination.
3. A provision may be made to invite all faculties of the institution in launch of the MOOC in each cycle of the implementation of the MOOC.
4. A provision to have a faster decision making pertaining to the implementation of the all activities of the MOOC should be in place
5. **May plan to have orientation /capacity building workshop for faculties & PG, M.Phil** Ph.D students in and faculties as well on various aspects of MOOC (design, development & Implementation), and TEL, Blended Learning Process etc.

Feedback, suggestions and comments received from learners of this first cycle are quite encouraging and motivating. They may be watched in the FORUM POSTS, hangouts and recorded for future references. I am sure leaning experiences of first cycle of implementation will certainly help us for more effective and efficient implementation in successive cycles of implementation.

## General Observations

- There are learners just enrolled to get certificate only. Hardly have they had interest and motivation towards use of various components in the MOOC. They take it very lightly and casually as a general webinar and think just to complete the quizzes and feedback, would be enough for certification. This is trend need to be discouraged with strategic implementation to ensure quality of implementation of MOOCs

- Many of the learners found to be scared of the assignment. However, assignment is one of the most relevant and important aspect of evaluation and a means of skill development and competency enhancement of learners (as an aspect of application of what is learnt) in the MOOC. More focus should be laid on assignments and assignment questions should have been made more practical based and realistic to evaluate individual competency and their performance. With this quality of implementation of MOOCs and its credibility can be enhanced.

- Reflection questions given at the end of each module was found to be instrumental as a means of brainstorming for learners. It provides them a clue to further discuss and demonstrate their abilities in the forum in the form of discussion and interactions.

Prepared By:

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**Principal Instructor**