UGC-HRDC, Dr, HARISINGH GOUR VISHWAVIDYALAYA, SAGAR, MP

Detailed Report on

Two Weeks Inter/Multi- disciplinary Refresher Course on "Data Analysis Using Statistical Methods" (ID RC06-20)

(06-19 August 2020)

Day 1 (06-08-2020, Thursday)

The Refresher Course opened with a formal Inaugural Session at 10.00 AM. The distinguished personalities in the virtual dais were **Hon'ble Vice Chancellor Professor R.P. Tiwari ji,** Dr. R.T. Bedre Sir, Director HRDC, Coordinators Dr. K.S. Mathur Sir, Assistant Professor, Department of Mathematics and Statistic and Dr. V.S. Matsaniya Sir, Assistant Professor, Department of Economics Dr. Harisingh Gour Vishwavidyalaya, Sagar, M.P. Dr. K.S. Mathur Sir Welcomed the 61 odd participants converged to HRDC, Sagar from all over India. Then Director Dr. R.T. Bedre addressed the participants. He expressed happiness to start the very first refresher course of its kind via online mode in the University. He also disclosed his confidence on the young and dynamic coordinators Dr. Mathur and Dr. Matsaniya for designing and executing this very important and inevitable refresher course on 'Data Analysis Using Statistical Methods'. He also made clear the rules and regulations for qualifying the refresher course and confirmed that, unlike other webinars and online FDPs, this is not an easy-go to participants. He also iterated the necessity of this course and its applicability in the alarming scenario of covid 19 pandemic. The learning objectives of the workshop were discussed in the meantime. Then the workshop was inaugurated by gracious Hon'ble Vice Chancellor Professor R.P. Tiwari ji. In the inaugural speech, the Hon'ble Vice Chancellor pointed out the importance of data analysis and congratulated the pro-active director for designing this course. Dr. Matsaniya Sir elaborated the expected outcomes perceived during the course and made vote of thanks to all distinguished personalities attended the Inaugural Function.

Second Session of the post-inaugural session was handled by eminent Professor **Diwakar Shukla**, **Head of Department of Computer Science and Applications, Dr. Harisingh Gour Vishwavidyalaya, Sagar** on '***Flavour of Data and Analysis***'. The resource person gave an overview of almost all statistical methods with practical examples. The descriptive statistical methods and its uses in research were explained by the presenter. He

explained how those techniques enable us to apply them in various research activities. Estimation techniques and its uses were described by the resource person before the virtual room audience. In short, Professor Shukla gave a "bird's eye view" of all statistical techniques which are very useful for participants of the refresher course. The session concluded with a question-answer interactions.

Third Session was taken by **Dr. Vandana Rajoriya, Assistant Professor, Department of English, Dr. Harisingh Gour Vishwavidyalaya, Sagar** on '***Profile of Dr. Harisingh Gour Vishwavidyalaya, Sagar, MP***'. The main theme of the talk was to show profile of the prestigious Dr. Harisingh Gour Vishwavidyalaya, Sagar. The resource person clearly explained the vision and mission of Doctor Harisingh Gour Vishwavidyalaya. The history of the institute including the founder and its various activities were explained by the presenter. She listed various schools of various disciplines functioning at the University. The lecture includes both academic and non-academic activities taken place in the University. The national, international, post-doctoral level collaborations of the University were also elaborated. The national and International level paper publications produced by the University, the extra and co-curricular activities, the activities for social empowerment etc. were listened by the participants. The session concluded with question-answer interactions.

Last Session was felicitated by **Dr. Dhiresh Kulshrestha, Associate Professor of Economics, Marwadi University, Rajkot** and threw light on '***Why Data Analysis is Important?***'. The presenter started with various classifications of data which is very important for empirical research, viz., qualitative and quantitative and also referred some authors who gave correct definitions of classification. It explained the steps starting with collection of data to end with interpretation of the results. He distinguished the nominal, ordinal, interval and ratio data in details with examples. The energy-boosted section ended with question answer- interactions..

Day 2 (07-08-2020, Friday)

The **Morning Session** of Day two, entitled '***Importance of Statistics in Data Analysis***' started with **Dr. Gajendra Kumar Vishwakarma, Assistant Professor, Department of Mathematics and Computing, IIT Dhanbad**. The resource person gave a nice introduction relating to the history as well as the application of Statistics, especially in the current scenario of Covid19 drug development. Then he distinguished sampling and census. He described the important steps in a household survey. He explained probability and non-probability sampling with examples. He distinguished sampling and non-sampling and cautioned the participants about the important sources of non-sampling errors creep into the research process. A brief account on diagrammatic and graphical representation of data were also described by the resource person. He conveyed to the participants how

to use descriptive and inferential statistics. And finally his speech ended with the various misuses and limitations of statistics. The session concluded with question-answer interactions.

Session two once again handled by **Dr. Dhiresh Kulshrestha, Associate Professor of Economics, Marwadi University, Rajkot** on an important theme of this refresher course, namely, '***Steps in Data Analysis Process***'. Speaker began with the different techniques of data collection and rules for collecting data. He explained structured and semi-structured approaches in data collection. The presenter nicely explained the various observational and dynamic methods for data collection and the limitation of each methods. Description of different methods of data collection such e-mail, telephonic etc also dealt with. Advantages and disadvantages of surveys also pointed out together with the various challenges in data collection. This very informative virtual session ceased with question-answer interactions.

The **post-lunch session** was taken by eminent demonstrator **Dr. Govind Prasad Sahu, Assistant Professor of Mathematics, Pt. Ravi Sankar Shukla University, Raipur** on the topic '***Statistical Variables'***. He started with the very useful technique for statistics practitioners-data validity and reliability. The term "variable" and its level of measurements were covered by the speaker with simple examples. Presentation of data using graphical and diagrammatic methods were also explored. The method of constructing frequency table, cumulative frequency table and relative frequency tables were also dealt with. The session concluded with question-answer interactions.

The resource person of **Last Session** was **Dr. Sushma Duraphe, Associate Professor. Department of Mathematics, Govt. MVM Bhopal**. The topic '***Measures of Central Tendency***' inducted in the refresher course benefited very much for participants from Non-Mathematical Sciences background. Sushma Madam began with some definitions of the word "statistics" given by various authors. After the basic concepts of frequency tables, the felicitator went through mathematical calculations of various measures of central tendency such as mean, median, mode, geometric mean and harmonic mean. The construction and uses of ogives also portrayed. The session was as effective as a face-to-face classroom session. The session concluded with question-answer interactions.

Day 3 (08-08-2020, Saturday)

Morning Session was handled by **Professor D.K. Dey, Head of Department of Statistics, Indira Gandhi National Tribal University, Amarkantak** on an important topic '***Theory of Probability***'. The eminent Professor began with some motivational examples from Physics which prompted the participants to eagerly listening the concept. The origin of theory of probability has been explained followed by world famous probabilistic-scientists including some Indian stalwarts. Definitions of

sample space, events, disjoint events, exhaustive events and independent events were explained. Classical definition of probability was nicely explained. In continuation to that, Professor Dey gave virtual room exercises on probability and all participants correctly answered the questions at once. A detailed probabilistic concept of coin tossing experiment and die throwing experiment were also discussed and explained how to calculate probabilities of events in such type of difficult situations. Some numerical examples were also discussed in the virtual room. The session concluded with question-answer interactions.

Session two once again handled by none other **Dr. Gajendra Kumar Vishwakarma, Assistant Professor, Department of Mathematics and Computing, IIT Dhanbad**. This time, Dr. Vishwakarma delivered talk on very important topic '***Random Variables and Distribution Functions***'. The presentation was well orchestrated**.** He introduced useful probability functions such as probability mass function, probability density function and distribution function. He has done so many examples in the live session. In continuation, joint probability mass function, joint probability density function and joint distribution function were conveyed to the participants. Further he introduced the concept of marginal, conditional and independence. He did an example in the live class as well. He introduced marginal means, conditional means, marginal variance, conditional variance and covariance. To clear the concepts, he did an example in the live class along with the participants. The session concluded with question-answer interactions.

Professor Joydip Dhar, Department of Applied Sciences, ABV-IIITM, Gwalior was with us on the virtual platform for delivering **Session Three** related to '***Theoretical Discrete Distributions***'. He started with some statistical pre-requisites and bypassed directly to moments, moment generating function and different methods for finding moments by differentiation technique. The first discrete distribution was Binomial distribution and its important properties. Then came geometric distribution and its properties, Poisson distribution and its properties followed by negative binomial distribution. Finally the concept of hyper geometric distribution was also introduced. The session concluded with question-answer interactions.

The **Last Session** was felicitated by **Dr. Govind Prasad Sahu, Assistant Professor of Mathematics, Pt. Ravi Sankar Shukla University, Raipur. Now the theme moved to** '***Theoretical Continuous Distributions***'**.** The learned Professor started with continuous random variables and probability density function and conveyed the participants how to calculate probabilities of random variables lying in an interval. Then the eminent Professor introduced uniform and normal distributions. The next was the high profile normal distribution in statistics, its properties and uses. He taught how to calculate the area under standard normal distribution which

was very essential for statistics practitioners. Some numerical examples were worked out in the virtual room. He then gave a brief account on distributions such as exponential, gamma, chi-square and t which are very useful in the analysis of real life data. The session concluded with question-answer interactions.

The format of project proposal and seminar was given by the coordinators on Day 3.

Day 4 (10-08-2020, Monday)

Session One devoted to an important crux of the refresher course and was related to inferential statistics on '***Testing Hypothesis and Large Sample Tests'***. One of the very crucial sessions of this refresher course was handled by **Dr. Poonam Sinha, Assistant Professor, Department of Mathematics, SMS Government Model Science College, Gwalior.** The high profile speaker narrated terms such as statistic and parameter, standard error, null hypothesis, alternative hypothesis, type 1 error, type 2 error, critical region, level of significance main steps in test of hypothesis. Then she navigated through many large sample tests for proportion and test for difference proportions were explained with the help of examples. Large sample test for single and difference of two means were nicely presented. Large sample test for difference standard deviations were also presented. Several problems were solved in the session. In this session a huge volume of knowledge shared which will be very essential for all participants. The session concluded with a fruitful question-answer interactions.

In continuation of session one, in **Session Two**, **Dr. Poonam Sinha,** introduced another core topic namely '***Sampling and Small Sample Tests'***. The session started with sampling and different methods of sampling like simple random sampling, stratified sampling etc. The learned resource person orderly introduced the various tests like t test, F test and chi-square test etc. Different tests of hypotheses using t test had been introduced. Test of a single mean for significance was then introduced with example. Testing the equality of two population means was then introduced with the help of protein-diet problems. The uses of t test in testing correlation and regression was introduced in the live class. F test for equality of variances was explained with an example to illustrate it and also described Fisher's Z test. Participants were very much benefited by these two back-to-back sessions by Dr. Poonam Sinha. The session concluded with question-answer interactions.

The **Third Session** after lunch was delivered by **Professor N.G. Pendse, Department of Economics, RDV, Jabalpur** on '***Correlation and Regression'.*** The stalwart started with some motivating examples of correlation like temperature and sale of ice-creams, and tomatoes supply and price. Then he introduced definition of correlation and its two type viz. negative and positive correlation. Some diagrammatic representation of

correlation had been presented for positive correlation, negative correlation and no correlation. Karl Pearson measure of correlation coefficient also introduced along with graphical method. It explained correlation can be determined from correlation table. A numerical problem was worked out in the class using correlation coefficient method and concurrent method. Then it was the tern of rank correlation. Finally he concluded with testing correlation coefficient. The session concluded with question-answer interactions.

Professor N.G. Pendse continued lecture on the topic in **Last Session** also. It devoted to the concept of regression analysis another core topic of this programme. He explained the distinction between correlation and regression the latter is used for forecasting purpose. Professor illustrate some examples to stress his discussion point, like, if interest less then home loan will increase. Some economical terms like MPC and Keyen's law also described. Some applications of regression analysis in various fields were also mentioned. Then he explained the concept of stochastic disturbance term and the factors responsible for this. The session concluded with question-answer interactions.

Day 5 (11-08-2020, Tuesday)

The **Morning Session** of Day 5 was delivered by **Dr. Muslim Malik, Associate Professor of Mathematics, IIT Mandi** on '***Curve Fitting and Principle of Least Squares'.*** First the Professor introduced self-learning components of his lecture. The importance of numerical analysis and numerical differentiation and integration with the help of computers. He introduced integer mode and floating - point mode and error analysis. Some concept on mantissa, base and exponent were also introduced. Binary and decimal representation of numbers in computers and calculators were then discussed. Rounding, chopping, error and relative error had been explained. Then the term truncation error was briefly explained. Revision exercises like limit, continuity, Rolle's theorem, mean value theorem, Taylor theorem, intermediate value theorem etc. Some methods of interpolation including least squares method were explained. Distinction between interpolation and extrapolation also discussed. Lagrangian interpolation polynomial with an example and error in Lagrangian polynomial. Newton's form of interpolation, divided differences and examples were given. Brief idea on piecewise linear interpolation, least squares, and some example were given. The session concluded with question-answer interactions.

Session Two was taken by **Dr. Manoj Kumar, Assistant Professor, Centre for Economic Studies and Planning, School of Social Sciences, JNU**. The theme of the session was '***Overview of Research Challenges in Social Sciences'.*** With definition of research, he pointed out the need of research in covid19 situation as well as flood situation. He then explained the various steps namely identification of problem, formulation of hypothesis, data

collection and data analysis. Main steps in identification and formulation of research problem were explained nicely. The seven challenges of research also delivered. He then introduced different form of data like nominal, ordinal, interval and ratio. The necessity of sample size determination also mentioned. Then he explained the analysis strategy to be adopted and various statistical methods to be adopted in a research. The session concluded with a list of parametric and nonparametric methods used in the research. The session concluded with question-answer interactions.

The post-lunch session started with **Dr. Rakesh Chandra, Assistant Professor, School of Health System Studies, Tata Institutes of Social Sciences, Mumbai.** The focus of this session was to impart practical knowledge on '***Analysis of Time Series Data'*** which has wide applications in especially in the field of econometrics. Speaker introduced various components of time series like random, trend, cyclic and seasonal. The concept of stationary and non-stationary time series were then discussed. The concept of auto-correlation was also introduced. The concept of ARIMA model discussed in detail. A case exercise using R was also made and the R output displayed. Summary tables like minimum, maximum, mean etc displayed. Different data plots were also shown. The method of decomposing of time-series also explained. Running time series on R package also explained. The interpretation of various coefficients of output were briefly explained. The install process of R package was also introduced. The session concluded with question-answer interactions.

The **last session** focussed on the recent trends in online education which was delivered by **Dr. Vinod Sen, Assistant Professor of Economics, Indira Gandhi National Tribal University, Amarkantak** on ***'Higher Education in the Era of Covid-19-Some Empirical Evidences***'. The theme of lecture was to explain the pros and cons of online education in the time covid19 pandemic. In education sector, alternate method of working, work-from-home introduced Indian economy badly affected by all sectors both in formal and informal sector. A detailed list of number of Universities in India 2018-2019 was represented. He then pointed out the various objectives of the study. Respondents classification on age-wise given where majority in 18-26 years. Satisfaction level from traditional classroom higher than virtual classroom. He then pointed out need for online classes. He then explained tools available for online education. Then the results of empirical survey presented like level of satisfaction on online test etc. Then several issues related to virtual classroom listed. Then he listed several issues faced by students. He then explained many problems faced by educators. Finally his presentation end with concluding remarks. The session concluded with question-answer interactions.

Day 6 (12-08-2020, Wednesday)

The **first session** was handled by **Dr. Poonam Sinha, Assistant Professor, Department of Mathematics, SMS Government Model Science College, Gwalior** and the topic was very important for the refresher course namely '***ANOVA test***'. The learned Professor started with the importance of ANOVA. The ANOVA is used for comparing more than two groups. The main assumptions in ANOVA like normality, independence, additively were discussed. There are two types of ANOVA-One way and two-way. In one way ANOVA only one factor is considered. The null hypothesis and alternative hypothesis also introduced. Total variation divided into two-between and within variations. Method of calculating between variations and within variations were discussed. A shortcut method also discussed. Then ANOVA table presented. A numerical example also discussed in the class. Similarly two way ANOVA with numerical problem also discussed. The session ended with QA session. The session concluded with question-answer interactions.

Session Two was the continuation of session one and once again handled by **Dr. Poonam Sinha, Assistant Professor, Department of Mathematics, SMS Government Model Science College, Gwalior** and the topic was ***'Parametric and Non-parametric Tests'***. She started with introduction of different non-parametric methods. She explained the merits and demerits of parametric and non-parametric methods. First of all run test for randomness with an example. Median test with an example also introduced. Sign test for matched pairs was then introduced with the help of a numerical example. Disadvantages of the sign test is that magnitudes were not considered. To overcome this Wilcoxon signed rank sum test was introduced. An example also given to understand the things clear. Then Mann-Whitney U test was then explained with the help of a numerical example. Then Kruskal Wallis test alternative to ANOVA was described. The Friedman's test for k samples explained. The session concluded with question-answer interactions.

Session Three started with **Professor D.K. Dey, Head of Department of Statistics, Indira Gandhi National Tribal University, Amarkantak** on '***Exploratory Data Analysis'.*** Professor started with a note on sample registration system in India. He explained the genesis of sample registration. SRS organized by the office of the Registrar General in India. Sample design is simple random sampling. For larger villages stratified random sampling has been adopted. Population less than 2000 stratum 1 is used, otherwise stratum 2. Rural stratification also explained. SRS also describes various rates of vital events. Data on vital events were collected in dual record system. A formula for sample also described. Several features of reorganization in new sample were described. Professor then described the different scope of data. He then pointed out the advantages of unique identification code and its basic structure. Different estimation formulae given in the talk. He then explained main components of SRS. Then some

insight on life tables were introduced. The session concluded with question-answer interactions.

The **Last Session** of Day 6 was delivered by **Prof. Kanhaiya Ahuja, School of Economics, DAV Indore** on a very informative topic on '***Composite Index Method'***. Professor started with his contribution to developing the proposed index. He then portrayed the global scenario of water problem, ground water scarcity and like the so forth. He then listed several factors and explained environmental destruction in India Definitely there will be conflict between growth and environment. The resource person then explained the need for sustainable development. He then described QOL, QOE, SEII the various indices developed by him. Then he explained the methodology for constructing such indices. The different indicators for constructing QOL index explained. He then listed the parameters of indicators of quality of environment and socio-economic indices. He effectively presented a two-way classification table also. The session concluded with question-answer interactions.

Day 7 (13-08-2020, Thursday)

Professor Joydip Dhar, Department of Applied Sciences, ABV-IIITM, Gwalior started the **First Session** focusing on the recently coined topic on '***Data Mining (Association Mining, Data Clustering and Data Classification)***'. He pointed out that the aim of data mining refers to extracting or mining knowledge from large amounts of data. Distinction between data base and data mining were conveyed to the participants. He then described large data bases. Some scenarios of data warehousing were introduced. A formal definition of data warehouse was then nicely presented by the learned Professor. Various data warehouse schema were then introduced. He then urged the need for data pre-processing. Some data transformation methods were then given. Data mining technique of association was then explained. The decision tree diagram of association rules was portrayed.

Professor Joydip Dhar, again resumed the same session after a tea break. He elaborated an algorithm for constructing support and confidence level with an interesting example relating to computer and accessories model. Then the professor again revisited the Amazon example and illustrated the concept very clearly. Data clustering was the next interesting topic with illustrations. Some standard clustering techniques were then explained with how to construct dendrogram. Now-a-days classification algorithms attracts attention of many data scientist, and the eminent Professor explained its application in a simple way. The session concluded with question-answer interactions based his back-to-back sessions.

After completing the theoretical sessions on statistical methods, the scene then shifted to hands-on-training session. In **Session Three**, the speaker was **Dr. Preeti Kathuria, Assistant Professor of Economics, Shri**

Vaishnav Vidhyapeeth Vishwavidhyalaya, Indore and the topic was an important session on '***Data Analysis Using SPSS'***. The aim of this session was to help participants in doing their research work on commercially available and sophisticated software SPSS (Statistical Package for Social Science). The speaker provide training from the basic entry of data through coding. She then explained how to deal with missing values, nominal, ordinal and scale variables. A real life problem was given to enter it in SPSS data sheet and showed how to do analysis from the pull down menu. The first one was to produce descriptive statistics. The obtained output was then interpreted which was very useful for the participants. The session concluded with question-answer interactions.

The **Last Session** was again continued by **Dr. Preeti Kathuria.** The importance of non-parametric chi-square test was explained in detail. An example was given and its output interpretations also made. Form the analysis menu of compare means, the learned resource person showed how to do t-tests and ANOVA were explained. The option for Spearman rank correlation, regression analysis, producing diagrams and graphs using SPSS were also demonstrated. The session concluded with question-answer interactions.

Day 8 (14-08-2020, Friday)

Morning Session of Day 8 was taken by **Dr. Rahul Suresh Sapkal, Assistant Professor, School of Management and Labour Studies, Tata Institute of Social Sciences, Moumbai** on '***Decomposition Methods for Labour Economics'***. The Professor started with a nice introduction about his topic of talk. The theme is to decompose the mean difference exists between sex or race or so on. Resource person quoted several articles relating to his topic of talk. The decomposition method is based on the idea of classical linear regression method. The first decomposition method was Oaxaca-Blinder method. A numerical example of this method was explained by the resource person by quoting his own published work. The resource person explained an important table of his own work to explain in detail. Then a multinomial logistic model was presented. Then the proposed decomposition model is applied to establish various relationship. He motivated the participants to actively participate in the interactions. The session concluded with question-answer interactions.

Second Session was continuation of Session One once again by **Dr. Rahul Suresh Sapkal.** This session also devoted to enhance data analysis skill of participants. He introduced another sophisticated software STATA to the participants. The data collected across treatment and control groups. Different subsample compositions and frequencies were generated. First of all ANOVA for wages produced based on treatment and control groups. Different interpretations of relation between dependent variable and independent variable by controlling other factors were nicely explained by

the resource person. Different models were generated in STATA and interpreted. The session concluded with question-answer interactions.

Session Three also intended to learn software skills for data analysis and was once again taken by **Dr. Rakesh Chandra, Assistant Professor, School of Health System Studies, Tata Institutes of Social Sciences, Mumbai.** This was another crucial session in the course and dealt with the freeware R on **'Use *of R Packages in Statistical Analysis of Data***'. The hands on trainer, first gave lesson about how to download the R Package and R-studio. He waited patiently till all participants downloaded it in their computer. He elaborated the applicability of the package and compared it with other packages. He then explained how a package can be installed through library function. Basic arithmetic operations were then taught. He, together with participants did various simple functions in R programming. The session concluded with question-answer interactions.

The last session also handled by **Dr. Rakesh Chandra** on R Programming. This session started with open a new script and how to save it in working directory. We can change the particular element of a vector by a command. Sequence function can be called by seq(). The addition of two vectors was shown and gave idea about matrices and how to generate data. He then gave hands-on-training to do statistical analysis and how to plot graphs in R interference. The session concluded with question-answer interactions.

Day 9 (15-08-2020, Saturday)

Morning Session was handled by **Professor D.K. Dey, Head of Department of Statistics, Indira Gandhi National Tribal University, Amarkantak** on an important topic of Indian Statistical system namely '***Dynamics of Concept and Definition in Indian Census***'. The Professor started with the definition of census from standard dictionaries. Census data was collected by NBS. Indian census is the largest census in the world. The eminent resource person briefed the different questions and options given in the last census carried out at 2011. He then explained pre-census activities and the new facilities like bar codes etc. The learned Professor end up with a quote by Tagore and followed by an interactions with participants.

Session two was deliberated by **Dr. Kailash Vishwakarma, Associate Professor, BNPG College Rath Hamipur** on '***Application of Vedic Mathematics for Statistical Analysis***'. Professor started with Independence day message video. Then he has given a numerical problem which gave too much time to solve in calculator or computer by the participants. Then some statistical functions were described which need time consuming calculations. The techniques of Vedic Mathematics is just opposite to the traditional way, he argued. Participants did the exercises given by the speaker quickly by the learned methods. The applicability of Vedic Mathematics to calculus of differentials was explained. As per participant's request squaring of hexa-decimal numbers also demonstrated

with the help of vedic mathematics. The session concluded with question-answer interactions.

After completing successfully the theoretical and practical sessions of data analysis, the scene shifted to the evaluation part of the programme. In **Session Three**, **Dr. Govind Prasad Sahu, Assistant Professor of Mathematics, Pt. Ravi Sankar Shukla University, Raipur** chaired the 'Seminar Presentation' event. Professor Sahu started the session with the rules, regulations and assessment criteria of the seminars by the participants. The participants amazingly presented their topic with candid power and energy. 11 participants presented seminar based on various topics. All the participants tried their best to finish topics in allotted time period. Professor Sahu appreciated the various presentations. As the presentation from different areas, it might not be a reason for asking questions for the learned Professor. He thank all participants to concluding the seminar timely.

Last Session also the continuation of session three but the chair changed to two eminent resource persons, **Dr. Rashmi Mathur, Assistant Professor (Principal), Department of Higher Education, Government College Lidhoura, Tikamgarh**. In this session 9 participants presented seminar topics in diverse field of their study. All the participants tried to perform their best both in explanation and time management. After the presentation of each participants the resource persons asked quires related to respective topics and important suggestions were also made.

Day 10(17-08-2020, Monday)

Morning Session was also '***Seminar Presentation'*** chaired by **Dr. Gajendra Kumar Vishwakarma, Assistant Professor, Department of Mathematics and Computing, IIT Dhanbad**. A total of eleven participants presented seminar topics relating to various subjects. Professor Vishwakarma supported and motivated the participants.

The chairman of **Second Session** was the eminent **Professor G.M Dubey, Department of Economics, Dr. H.S. Gour University, Sagar.** In this session 14 participants presented their topic and the experienced Professor supported the participants along with some important suggestions.

In the **Post-Lunch Session**, all the remaining participants presented their seminar topics and the session was chaired by **Professor S.K. Mishra, Department of Economics. Vikram University, Ujjain**. He supported the presenters very positively and asked many questions pertaining to it.

In the **Last Session**, an important event began, that is the '***Project Proposal Presentation***'. The session was once again chaired by **Professor Rajesh K Gautam, Department of Anthropology, Dr. H.S. Gour**

University, Sagar. Eight participants presented the proposed project in diverse fields and the chairman made some important suggestions to modify the projects so that the funding agency can able to grant funds for doing it.

Day 11(18-08-2020, Tuesday)

The **Morning Session** of '***Project Proposal Presentation***' was chaired by **Dr. Rekha Garg Solanki, Assistant Professor Department of Physics, Dr. H.S. Gour University, Sagar.** There were a total of ten participants presented their project proposal. Participants presented topics from various areas of their domain. Chairman supported and motivated all the participants.

Session Two was chaired by **Prof. Kanhaiya Ahuja, School of Economics, DAV Indore.** With is huge knowledge in the research field, he supported the presenters very positively and asked many questions. The participants presented topics from various areas of their disciplines. In this session 10 participants presented their proposal brilliantly. The mood of the fellow participants were also supportive.

The **Post-Lunch Session** was chaired by **Dr. Rashmi Mathur, Assistant Professor (Principal), Department of Higher Education, Government College Lidhoura, Tikamgarh.** In this session eight participants presented their project proposal with good time management. The chair asked questions and gave some important modifications to their proposed project.

Last Session started with a brain-teasing '***Multiple Choice Test***' as part of the evaluation process. All the participants attended the MCQ after revising the topics covered in the refresher course. The test was conducted via Google Quiz. After submitting the response sheet, participants could able to saw their scores.

Day 12 (19-08-2020, Wednesday)

Session One started with '***Project Proposal Presentation'*** and the resource person was **Professor Jagdish Khobragade, Assistant Professor, National Law University Nagpur**. A total of eight participants presented their project proposal. The resource person, listened to their presentations and made remarkable comments on them.

Professor Yatindra Singh Sisodia, MPISSR Bhopal, started **Session Two** of '***Project Proposal Presentation'***. A total of nine participants presented their project proposal. The resource person, listened to their presentations and made detailed comments/suggestions.

In **Session Three,** renowned Professor **Surendra Kumar** University of Delhi chaired '***Project Proposal Presentation'***. The remaining participants presented their proposal very well and the chair supported them as well.

Last Session was devoted to '***Feedback and Valedictory'*** from among the participants of the refresher course, and the felicitator was our fellow participant **Dr. Argha Sarkar**. All participants expressed high satisfaction on topics covered, practical done, quality of resource persons and the way in which the programme was orchestrated by Team HRDC, Dr. Harisingh Gour Vishwavidyalaya, Sagar, MP. In the valedictory function the Director Bedre sir congratulated coordinators Mathur sir and Matsaniya sir for their hard work and dedication for the giant success of the programme. Valedictory function terminated with vote of thanks by Dr. K.S. Mathur, and the participants virtually departed from Sagar with the feeling of attending one of the very effective knowledge gaining courses in their life.

Figure 1: Coordinator Dr. K.S. Mathur receives memento from Director Dr. R.T. Bedre, HRDC, Dr. Harisingh Gour Vishwavidyalaya, Sagar, M.P in the Concluding session of Inter/Multidisciplinary Refresher course on "Data Analysis Using Statistical Methods'.

Figure 2: Coordinator Dr. V.S. Matsaniya receives memento from Director Dr. R.T. Bedre, HRDC, Dr. Harisingh Gour Vishwavidyalaya, Sagar, M.P. P in the Concluding session of Inter/Multidisciplinary Refresher course on "Data Analysis Using Statistical Methods'.