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Effectiveness of online capacity building programs in wholistic development of faculties: an empirical analysis

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Abstract

Purpose – Faculties have a vital role to play in ensuring that their graduates are trained with relevant skills. Formally arranged capacity building programs (CBPs) can aid in training and retraining the faculties with relevant contemporary skills so that they in turn can do justice to their students. The purpose of this study is to analyze the efficacy of such public-funded online CBPs in enhancing faculties' research and teaching capabilities.

Design/methodology/approach – Ascientifically designed questionnaire was sent to faculties who attended 12-day public-funded online capacity building workshop. Binomial logistic regression models were constructed to analyze as to how effective the online workshop was in enhancing teaching and research skills of the faculties involved.

Findings – From the research study, the authors were able to infer that although faculties were able to understand theoretical concepts of qualitative nature relatively easily, the authors felt that its value addition in enhancing the research output was rather limited. The study also found that the faculties felt teaching concepts outside their "syllabus" to be counterintuitive. A significant finding of the study was that research had an important role in enhancing their teaching efficacy.

Originality/value – Studies which are undertaken to test the efficacy of online capacity building workshops are scarce. This domain is going to gain importance in near future as technology is evolving at a rapid rate and online training of faculties helps in optimizing scarce resources.

Keywords Faculty development program, Contemporary skills, Public funded programs, Career orientation, Research skills, Online training

Paper type Research paper

1. Introduction

There is a growing consensus among the teaching fraternity that education to serve its purpose must bridge the gap between industry and academia (Bisaria, 2011). To achieve the same, there is a need to restructure and realign the syllabus on a regular basis. Doing so ensures that the syllabus is in line with the needs, expectations and requirements of the industry. Any youth acquiring such relevant skills from contemporary education shall be able to secure both his/her life and livelihood (Leicht *et al.*, 2018; Zucca-Scott, 2010). For providing relevant education, regular training of teachers plays a vital role. This would help them to inculcate relevant skills and knowledge among their students, which in turn would enable their students to be an asset for their family and for society at large (GoI, 2020).

A teacher to stay relevant in his/her chosen domain must not only be a good academician but must also be a good researcher (Mulford, 2003). Teaching and research are inseparable

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from one another. Teaching is not just about theoretical concepts. Even if the teacher tries to explain the theoretical concepts, without explaining their practical implications, the students would not be in a position of using that theoretical knowledge to solve practical problems. If knowledge of any particular domain cannot serve the greater purpose of identifying and solving the contemporary problems of society, then such knowledge cannot be considered wholistic or relevant. An academician with a researcher's mindset will be capable of leveraging theoretical knowledge to identify and critically dwell upon contemporary issues of relevance. Such a teacher would be in a better position to guide his/her students to effectively use their subject knowledge to bring about betterment in their life and society. In this regard, if an academician wants to do justice to his/her subject, he/she must train himself/herself to be a good researcher (Begum *et al.*, 2015). This is more so true in case of faculties belonging to humanities and management. This is so because in pure sciences, observations are universal. For instance, the law of gravity holds the same, despite spatial and geographical construct. When it comes to theories and observations of social sciences and management, they are not only influenced by the prevailing socioeconomic factors but also by the constructs of space and time. In this regard what can be regarded as true for one nation, one culture or sometimes even one region cannot be equally valid for the other. Hence, research is important. Further, quality and precision of inferences depends upon the nature and construct of statistical tools. This in turn requires the faculties to be trained in advanced statistical tools and packages (Misra, 2012).

As important as training can be to faculties, one cannot realistically expect the faculties to dedicate time and resource for self-upgradation without any formal support. The technical nature of advanced statistical tools, packages and empirical concepts are such that it requires an experienced mentor to guide them (Chappell, 2000). Even if faculties are adept in learning, formal training sessions help them to get a better clarity and understanding of the concepts in question (Tuffrey-Wijne *et al.*, 2020).

When it comes to undertaking formal training at macrolevel, the importance of leveraging information communication technology to achieve the objectives of training cannot be undermined (Gulbahar and Guven, 2008; Fuglestad, 2009; Kumar *et al.*, 2020). Online training programs come with a plethora of advantages as compared to conventional training programs. They help the resource person and participants alike to overcome time and spatial constraints. Many student-centric studies have been conducted to evaluate the efficacy of online teaching and training programs. However, such studies with regards to faculties are scarce. Our study seeks to bridge this gap.

Our study is more so relevant in the context of Karnataka. Karnataka is not only one of the pioneer states in implementing the National Education Policy 2020 in India, but the teaching–learning pedagogy of its traditional universities leaves much to be desired. In this backdrop, syllabus, particularly of social sciences faculty, is being radically redesigned to address the practical problems of Indian society. Until now in the field of social sciences, particularly in the traditional universities of Karnataka, emphasis on either using econometric tools or inculcating teaching–learning pedagogy, which emphasized on understanding and solving contemporary problems through empirical analysis, was rarely present. The National Education Policy emphasizes on promoting practically relevant multidisciplinary studies in undergraduate and postgraduate courses (Aithal and Aithal, 2020; Malik, 2021). To ensure that the faculties are well equipped to do justice for the aforesaid objective, the Indian Council of Social Science Research (ICSSR), a government agency, is actively funding online and offline faculty development programs to inculcate required skill set among teaching fraternity of higher educational institutions. Given the spatial constraints and work commitments that the faculties have, online faculty development programs are seen as relatively more flexible and easier to attend. In this backdrop, our study has attempted to analyze the efficacy of online faculty development program conducted by the ICSSR in

bringing about teaching and research improvement among the faculties in the state of Karnataka, India.

2. Literature review

Previously undertaken studies (Buchanan, 1999; Peters, 2000; Selwyn, 2016) assert that information communication technology can positively enhance teaching learning experience. Information communication technology in the field of education refers to any service, application or digital device which could enhance learning experience. Some of the studies (Bousbahi and Alrazgan, 2015; Harris and Rea, 2019) indicate that current generation learners are more adept in using information communication technology than their teaching facilitators. Teachers to stay relevant in their domain and do justice to their responsibility must be trained on regular basis. Relative to online training programs, offline training programs are more suited to train faculties (Chetan Kumar *et al.*, 2021). Despite the obvious advantages of offline training programs, it has its share of spatial and time constraints which may dissuade interested participants from participating in them (Chetan Kumar *et al.*, 2021). A feasible noteworthy alternative can be found in online platforms. The advent of COVID-19 and its consequent impact on academia has inadvertently shown the feasibility of using online platforms for learning and training. Although many studies (Nadaf, 2017) have tried to identify the efficacy of online platforms in dispersing knowledge to students, such studies with regards to training teachers are scarce.

Although using information and communication technology (ICT) to enhance teaching learning experience has been in vogue in western setup, such developments are relatively new in the context of developing countries. In the backdrop of National Education Policy 2020, there has been a genuine effort to inculcate decision sciences in humanities and management with an objective of making the students become problem-solvers rather than just job seekers. Faculties often cite time and personal commitments as a hurdle to attend capacity building programs (CBPs). In this backdrop, online training of faculties can go a long way in addressing the aforementioned concerns.

However, online CBPs are relatively new in India. They started gaining prominence in the aftermath of Covid-19-induced nationwide lockdowns, which were imposed in 2020 (Yekin *et al.*, 2020). Even after 2021, apex research institutions, like the ICSSR, are actively funding online CBPs to improve research and teaching skills of faculties. As contemporary studies relating to efficacy of such online CBPs for teachers are scarce, our study aims to bridge the concerned research gap.

3. Objectives

(1) To analyze the extent to which the faculties attending online capacity building program were able to understand research and teaching concepts.

(2) To analyze as to how effectively faculties can practically implement concepts related to research and teaching in real world.

4. Research methodology

4.1 Data collection and sampling design

The ICSSR has been actively organizing online and offline CBPs to facilitate the improvement of teaching and research skills among faculties belonging to humanities, commerce and management. Data were collected by the investigator in one such 12-day online CBP, which was conducted by the Economics Department of Davangere University, Karnataka, under the

sponsorship and guidance of ICSSR. A scientifically designed questionnaire was sent via Google form to all the participants who had participated in the online CBP. Out of 253 participants, 175 responded.

Nature of the program – The syllabus of 12-day online CBP broadly comprised three sections: first section dealt with theoretical concepts of research, second section comprised classroom teaching methods and the last section dealt with statistical and inferential tools.

4.2 Characteristics of sample

Designation and nature of employment –Among 175 respondents, 80.57% were serving as assistant professors, 12% were serving as lecturers and 7.42% were pursuing full-time research.

Qualification – Among the respondents, 17.14% had completed masters, 39.42% were pursuing doctorate and 43.42% had completed their doctorate.

Age – The age of faculties ranged from 33 years to 55 years whereas the age of research scholars ranged from 23 years to 45 years.

Preferred medium of instruction among respondents – Among respondents, 50.28% of the participants preferred English as a medium of instruction whereas 49.14% preferred regional language as medium of instruction. It is to be noted that in the program, only English was used as the medium of instruction.

Familiarity among statistical tools among respondents – Among respondents, with regards to statistical packages, 35.47% of participants were familiar with EViews, 36.67% of participants were familiar with SPSS and 32% of the participants were familiar with STATA. As far as programming languages like R and Python were concerned, only 30% of the participants were familiar with them.

4.3 Relevance of the sample in the context of study

Among 175 respondents, 80.57% were serving as assistant professors. Of whom, 82% were working in government-run educational institutions. Furthermore, nearly 85% of the respondents were below 50 years of age. Given the importance of government institutions in serving the needs of masses and the emphasis of NEP in inculcating decision sciences in humanities, along with spatial and time constraints of offline workshops, evaluating the efficacy of online CBPs with the sample at hand was relevant for strengthening the academia.

4.4 The research model's design

The objective of the study was to understand the efficacy of online CBPs in enhancing teaching and research capabilities of faculties involved. The two categories were further subdivided to garner inference on how well the participants were able to understand the concepts which were taught in the online platform and how confident they were in incorporating the same in their teaching and research.

The design of the model is summarized in Figure 1.

4.5 Item reliability test

Cronbach's alpha – To check the internal consistency of closely related sets of questions in the questionnaire, Cronbach's alpha was used. The results of Cronbach's alpha pertaining to various sets of questions designed to capture the relevant information are summarized in Table 1.

From Table 1, we can observe that the scale reliability coefficient of Cronbach's alpha is in the range of 0.94–0.95 indicating that the questions framed in the schedule are closely related with each other.

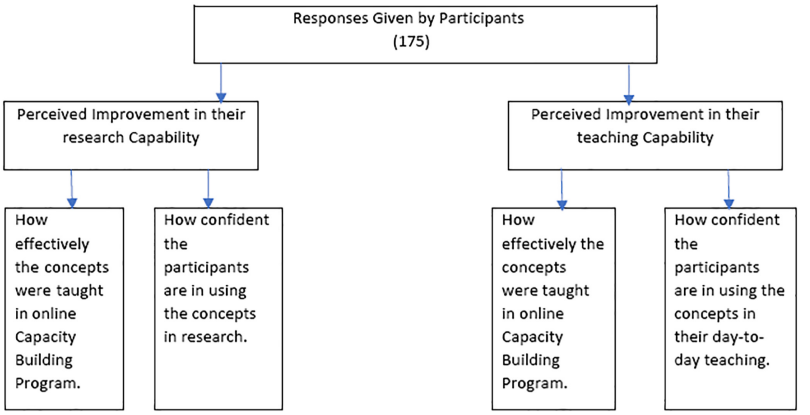

Figure 1.
Diagrammatical representation of research design

Sets of questions pertaining to	Number of items	Value of Cronbach's alpha
1. Perceived improvement in research capability of the faculties in the backdrop of how the concepts were taught in the workshop Items pertaining to qualification (2) Infrastructure (3) Familiarity with basic software (4) Familiarity with advanced software (4) Perceived improvement in using the concepts taught in workshop (28)	41	0.94
2. Perceived degree of confidence among faculties in practically using the concepts in their research Items pertaining to qualification (2) Infrastructure (3) Familiarity with basic software (4) Familiarity with advanced software (4) Perceived confidence among faculties in practically using the concepts taught in workshop (28)	41	0.95
3. Perceived improvement in teaching capability based on the concepts taught in the program Items pertaining to qualification (2) Infrastructure (3) Familiarity with basic software (4) Familiarity with advanced software (4) Perceived improvement in teaching capability among faculties through the concepts taught in workshop (28)	41	0.95
4. Perceived degree of confidence among faculties in practically teaching the concepts that they had learnt to their students Items pertaining to qualification (2) Infrastructure (3) Familiarity with basic software (4) Familiarity with advanced software (4) Perceived degree of confidence among faculties in teaching the concepts that they have learnt in workshop (28)	41	0.94

Table 1.
Value of Cronbach's alpha pertaining to various sets of questions

The binary logistic regression model is used when we are supposed to predict the probability of success when the dependent variable can have either one of two categorical outcomes. In

the model, the favorable outcome is designated as "success" whereas the other outcome is considered reference category. As all the dependent variables in our models were of qualitative nature with binary outcomes, we have made use of this model.

Binary logistic regression for a dichotomous categorical variable "Y" with multiple explanatory variables, x_1, x_2, x_3 .... x_k can be represented with the help of the following equation (Ari, 2016):

$$Logit\,[P(Y=1)] = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 \ldots + \beta_k x_k$$

which can also be represented by directly representing $\pi(x)$ as follows:

$$\pi(x) = \frac{n \exp(\alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k)}{1 + \exp(\alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k)}$$

In the above equation, β_i refers to the effect of x_i on the log odds that $Y = 1$, controlling other x_j (Ari, 2016).

A two-stage method has been used to estimate the predicted probability of success in perceived improvement of research.

(1) Calculation of odds ratio: The following formula has been used to estimate odds ratio.

$$\ln(p - hat/1 - p - hat) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \ldots \text{estimated}$$

(2) Calculation of estimated probability: Expected probability of success is calculated with the help of the following formula:

$$p - hat = \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 \ldots)/1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 \ldots) \text{ estimated}$$

4.6 Identification of variable

To understand as to how effectively the concepts were taught and how confident the faculties were in using the same in the domains of teaching and research, four binomial logistic regression models were constructed.

4.6.1 First regression model.

$$Y_{1,1} = \alpha_{1,1} + \beta_{1,1}X_{1,1} + \beta_{1,2}X_{1,2} + \beta_{1,3}X_{1,3} \ldots\ldots\ldots\ldots\ldots\ldots + \beta_{1,40}X_{1,40} + \beta_{1,41}X_{1,41} \quad (1)$$

In equation (1), the dependent variable is the "Efficacy of concepts taught in improving the faculty's research capability."

The independent variables of the first regression model along with their coefficients are summarized in Table 2.

4.6.2 Second regression model.

$$Y_{2,1} = \alpha_{2,1} + \beta_{2,1}X_{2,1} + \beta_{2,2}X_{2,2} + \beta_{2,3}X_{2,3} \ldots\ldots\ldots\ldots\ldots\ldots + \beta_{2,40}X_{2,40} + \beta_{2,41}X_{2,41} \quad (2)$$

In equation (2), the dependent variable is "the degree of confidence that the faculties had in practically using the concepts that they had learnt in workshop."

The independent variables of the second regression model along with their coefficients are summarized in Table 3.

The faculty's satisfaction	Parameters relating to research improvement and conceptual understanding	Coef.	Std. err	z	$P > z$
Comparison of "satisfied" vis-a-vis "Not satisfied "pertaining to perceived level of development of theoretical understanding of research concepts by attending online capacity building program (Base reference category: Not satisfied)	Age	−0.2812081	0.701703	−0.4	0.689
	Highest qualification	1.537443	0.699506	2.2	0.028*
	Knowledge of English	2.378177	1.035478	2.3	0.022*
	Effectiveness of device	−1.214663	0.943472	−1.29	0.198
	Combination of English with regional language	−0.6474392	0.867257	−0.75	0.455
	Network availability	0.0969905	1.047689	0.09	0.926
	Electricity	1.328661	1.181608	1.12	0.261
	Familiarity with Excel	−0.4514787	1.410252	−0.32	0.749
	Familiarity with Word	−1.470917	1.334847	−1.1	0.27
	Familiarity with PPT	3.011629	1.535823	1.96	0.05*
	Familiarity with Programming languages	−0.1917198	0.789022	−0.24	0.808
	Familiarity with EViews	0.1515243	0.850276	0.18	0.859
	Familiarity with SPSS	−1.398171	1.202689	−1.16	0.245
	Familiarity with STATA	−1.376573	0.969958	−1.42	0.156
	Familiarity with R	0.5693107	1.176889	0.48	0.629
	Familiarity with Python	2.824187	1.288441	2.19	0.028*
	Taught teaching methods	2.206608	1.244153	1.77	0.076
	Taught focussed group discussion	−0.1949258	1.303719	−0.15	0.881
	Taught literature review	1.673981	1.044048	1.6	0.109
	Taught triangulation	0.1260616	1.029114	0.12	0.903
	Taught online data searching	2.376984	1.391137	1.71	0.088
	Taught participatory learning methods	−1.476036	1.441066	−1.02	0.306
	Taught sampling method	0.3131715	1.521207	0.21	0.837
	Taught E-lib training	0.8205033	1.288031	0.64	0.524
	Taught research article	−0.1227092	1.182246	−0.1	0.917
	Taught research design	−0.3896017	1.470658	−0.26	0.791
	Taught hypothesis testing	−1.437759	1.751031	−0.82	0.412
	Taught lifelong learning	−0.0917117	1.257959	−0.07	0.942
	Taught interview schedule	2.521391	1.348554	1.87	0.062
	Taught qualitative research method	3.849051	1.852373	2.08	0.038*
	Taught measures of dispersion	−2.040601	1.763705	−1.16	0.247
	Taught SPSS	−0.8431227	1.523487	−0.55	0.58
	Taught statistical inferences	−1.846697	1.843298	−1	0.316
	Taught parametric and nonparametric tests	−0.8359871	1.560933	−0.54	0.592
	Taught chi-square tests	2.288373	1.902853	1.2	0.229
	Taught basics of regression	−5.455117	2.707688	−2.01	0.044*
	Taught *F*-test	1.314858	1.876605	0.7	0.484
	Taught *t*-test	2.587233	2.067363	1.25	0.211
	Taught measures of central tendency	0.9041207	1.26045	0.72	0.473
	Taught composing Research Art	−0.8364369	1.163918	−0.72	0.472
	Taught ethics	−0.6820191	1.55935	−0.44	0.662
	Online assignments	2.708132	0.963228	2.81	0.005*
	_cons	−8.978948	3.504841	−2.56	0.01*

Table 2.
Coefficient, standard error and along with ρ values of the binomial logistic regression model

Note(s): ** Significant at 5%

Faculty's satisfaction	Parameters relating to research improvement and confidence in practically using the concepts which were taught in workshop	Coef	Std. err	z	$P > z$
Comparison of "Confident" vis-a-vis "Not confident "pertaining to perceived level of confidence in practically using theoretical concepts among the faculties who attended the workshop (Base reference category: Not confident)	Age	0.0132621	0.2256868	0.06	0.953
	Highest qualification	1.464862	0.7229043	2.03	0.043**
	Fluency in English	2.482619	1.045612	2.37	0.018**
	Device used for access	−0.5615732	0.9844149	−0.57	0.568
	Effectiveness of English and regional language	−0.2225017	0.885679	−0.25	0.802
	Availability of network	1.06119	0.9092402	1.17	0.243
	Availability of electricity	0.6542064	1.007656	0.65	0.516
	Familiarity with Excel	1.734343	1.461366	1.19	0.235
	Familiarity with Word	0.107681	1.156177	0.09	0.926
	Familiarity with PPT	0.4730702	1.129445	0.42	0.675
	Familiarity with program languages	−0.9627234	0.8171953	−1.18	0.239
	Familiarity with EViews	1.311259	1.068485	1.23	0.22
	Familiarity with SPSS	−0.8665201	1.132534	−0.77	0.444
	Familiarity with STATA	−0.3171228	0.9856264	−0.32	0.748
	Familiarity with R	−1.011256	1.046662	−0.97	0.334
	Familiarity with Python	0.4302473	1.002606	0.43	0.668
	Confidence in using classroom techniques	0.0281217	1.135347	0.02	0.98
	Confidence focus group discussion	−1.465291	1.061098	−1.38	0.167
	Confidence literature review	0.0231433	1.017291	0.02	0.982
	Confidence triangulation	3.700035	1.476534	2.51	0.012**
	Confidence online data searching	3.564914	1.535921	2.32	0.02**
	Confidence participatory learning methods	2.003878	1.078659	1.86	0.063
	Confidence in using sampling methods	−0.2692291	1.303228	−0.21	0.836
	Confidence in accessing E-library	0.2983004	1.094019	0.27	0.785
	Confidence in research design	1.126189	1.054474	1.07	0.286
	Confidence writing research article	−0.3473591	1.186131	−0.29	0.77
	Confidence in hypothesis testing	−1.248027	1.121711	−1.11	0.266
	Confidence in inculcating lifelong learning	−0.5322267	1.457518	−0.37	0.715
	Confidence in preparing interview schedule	−0.4502863	1.707248	−0.26	0.792
	Confidence in using qualitative research method	−0.9716576	1.019373	−0.95	0.34
	Confidence in using measures of dispersion	0.6265001	1.061975	0.59	0.555
	Confidence in using basics of SPSS	−1.991879	1.309907	−1.52	0.128
	Confidence in using statistical inference	0.2169971	1.739677	0.12	0.901
	Confidence in using parametric and nonparametric tests	−0.702993	1.291461	−0.54	0.586
	Confidence in using chi-square tests	−2.740822	1.902016	−1.44	0.15
	Confidence in using basics of regression	0.0983391	1.281803	0.08	0.939
	Confidence in using ANOVA	1.012057	1.386485	0.73	0.465
	Confidence in using t-test	0.2283506	1.600022	0.14	0.887
	Confidence in using measures of central tendency	−0.3834349	1.273511	−0.3	0.763
	Confidence to compose research article	−0.0903641	1.328319	−0.07	0.946
	Confidence in inculcating ethics	0.8603785	1.28015	0.67	0.502
	Efficacy of online assignments	3.938986	1.069194	3.68	0.000**
	_cons	−8.125612	2.779213	−2.92	0.000**

Note(s): ** Significant at 5%

Table 3. Coefficient, standard error and along with ρ values of the binomial logistic regression model

4.6.3 Third regression model.

$$Y_{3,1} = \alpha_{3,1} + \beta_{3,1}X_{3,1} + \beta_{3,2}X_{3,2} + \beta_{3,3}X_{3,3} \ldots\ldots\ldots\ldots\ldots\ldots + \beta_{3,40}X_{3,40} + \beta_{3,41}X_{3,41} \quad (3)$$

In equation (3), the dependent variable is the "perceived improvement in the teaching perception of the faculties in backdrop of the concepts taught in workshop."

The independent variables of the third regression model along with their coefficients are summarized in Table 4.

4.6.4 Fourth regression model.

$$Y_{4,1} = \alpha_{4,1} + \beta_{4,1}X_{4,1} + \beta_{4,2}X_{4,2} + \beta_{4,3}X_{4,3} \ldots\ldots\ldots\ldots\ldots\ldots + \beta_{4,40}X_{4,40} + \beta_{4,41}X_{4,41} \quad (4)$$

In equation (4), the dependent variable is the "confidence among the faculties in practically teaching the concepts that they have learnt in the workshop."

The independent variables of the fourth regression model along with their coefficients are summarized in Table 5.

5. Results and discussions

5.1 Results pertaining to binary logistic regression

Through the first regression model, an empirical analysis was undertaken to identify as to how well the concepts related to research were taught so as to improve the research capability of faculties. The coefficients of dependent variable across tested categories are summarized in Table 2.

In Table 2, the coefficients of first regression model have been summarized. Through the regression model, an attempt had been made to understand the relationship between perceived improvement in research capability based on the parameters which would have affected the understanding of concepts among the faculties. Among the various factors identified in the table, we find qualification ($P > z = 0.028$), knowledge of English ($P > z = 0.022$), familiarity with power point presentations ($P > z = 0.05$), python ($P > z = 0.028$), qualitative research methods ($P > z = 0.038$) and online assignments ($P > z = 0.005$) to be statistically significant at 5% probability level. From the observation we can infer that, according to faculties, their fluency in English and their technical aptitude played an important role in enhancing their efficacy of understanding the concepts. Interestingly, understanding basics of regression, although statistically significant, appears to have an inverse relationship with faculties' perception of improving their research capabilities. It basically means that the concept of regression was taught in such an ineffective manner that the faculties seem to have completely misunderstood the concept.

Thus, from the table we can observe that, knowledge of English and advanced statistical packages was conducive to create a favorable learning environment among the faculties. Interestingly, faculties were able to grasp theoretical concepts easily and seem to have misunderstood the use of empirical tools.

Through the second regression model, we wanted to analyze the degree of confidence that the faculties had in practically using the concepts which they had learnt in the workshop. The coefficients of dependent variable across tested categories are summarized in Table 3.

From Table 3 we can observe that the faculties who have higher qualification ($P > z = 0.043$) and were fluent in English ($P > z = 0.018$) were more confident in practically using the concepts which they had learnt in the workshop. From Table 3, it is interesting to note that the faculties were confident in using only qualitative tools, such as triangulation ($P > z = 0.012$) and online data searching ($P > z = 0.02$) in their active research.

Faculty's satisfaction	Parameters relating to perceived improvement in teaching and conceptual understanding of research concepts	Coef.	Std. err	z	$P > z$
Comparison of "satisfied" vis-a-vis "Not satisfied "pertaining to perceived level of theoretical understanding of research concepts for the purpose of teaching among faculties who attended online capacity building program (Base reference category: Not satisfied)	Age	0.091322	0.1491968	0.61	0.54
	Highest qualification	1.410687	0.5480885	2.57	0.01**
	Fluency of English	1.068715	0.7675912	1.39	0.164
	Device used to access	−0.8168661	0.7112758	−1.15	0.251
	Combination of English and regional language	0.449908	0.7456582	0.6	0.546
	Quality of network	−1.119916	0.7407194	−1.51	0.131
	Electricity	2.532124	0.8622676	2.94	0.003**
	Familiarity with Excel	0.2939406	0.9836983	0.3	0.765
	Familiarity with Word	0.2925391	1.034663	0.28	0.777
	Familiarity with PPT	0.2093	0.981977	0.21	0.831
	Familiarity with programming languages	0.3630362	0.650674	0.56	0.577
	Familiarity with EViews	0.8304797	0.7110342	1.17	0.243
	Familiarity with SPSS	−1.053214	0.8972617	−1.17	0.24
	Familiarity with STATA	−1.238796	0.7543534	−1.64	0.101
	Familiarity with R	−0.4402526	0.8990844	−0.49	0.624
	Familiarity with Python	2.013131	0.8919737	2.26	0.024**
	Taught class room teaching methods	3.251919	1.016051	3.2	0.001**
	Taught focus group discussion	−1.533203	0.9816205	−1.56	0.118
	Taught literature review	0.7373753	0.7605637	0.97	0.332
	Taught triangulation methods	0.967062	0.9699928	1	0.319
	Taught online data searching	2.171882	1.110282	1.96	0.05**
	Taught participatory learning methods	−0.656136	1.071052	−0.61	0.54
	Taught sampling methods	−0.3655945	1.002082	−0.36	0.715
	Taught E-lib training	2.473004	1.018766	2.43	0.015**
	Taught research article	0.8418391	0.870426	0.97	0.333
	Taught research design	1.392742	1.071728	1.3	0.194
	Taught hypothesis testing	−1.824589	1.159766	−1.57	0.116
	Taught lifelong learning	−1.60372	1.089405	−1.47	0.141
	Taught interview schedule	0.7079604	1.068779	0.66	0.508
	Taught measures of dispersion	2.021461	1.089203	1.86	0.063
	Taught SPSS	−2.89866	1.216292	−2.38	0.017**
	Taught statistical inferences	−1.389049	1.245113	−1.12	0.265
	Taught parametric and nonparametric tests	−0.7046729	1.1663	−0.6	0.546
	Taught chi-square tests	1.236641	1.350344	0.92	0.36
	Taught basics of regression	−0.4215431	1.501944	−0.28	0.779
	Taught *f-test*	0.2427492	1.296958	0.19	0.852
	Taught t-test	−0.9499592	1.731059	−0.55	0.583
	Taught measures of central tendency	2.930039	1.050928	2.79	0.005**
	Taught composition of research article	−1.349194	1.035618	−1.3	0.193
	Taught ethics	0.3498695	1.079878	0.32	0.746
	Online assignments	0.9463482	0.719924	1.31	0.189
	Constant	−9.392148	2.783494	−3.37	0.001**

Note(s): ** Significant at 5%

Table 4.
Coefficient, standard error and along with ρ values of the binomial logistic regression model

Faculty's satisfaction	Parameters relating to perceived improvement in practical teaching of research concepts to students	Coef.	Std. err	z	$P > z$
Comparison of "satisfied" vis-a-vis "Not satisfied "pertaining to perceived level of confidence among faculties to practically teach research concepts to students by attending online capacity building program (Base reference category: Not satisfied)	Age	0.8111339	0.4447382	1.82	0.068
	Highest qualification	2.075774	1.392049	1.49	0.136
	Fluency in English	−3.346195	2.112773	−1.58	0.113
	Device being accessed	−3.836651	2.562486	−1.5	0.134
	Combination of English and regional language	5.685312	2.560729	2.22	0.026**
	Quality of network	−3.895307	1.933202	−2.01	0.044**
	Availability of electricity	3.347689	1.655599	2.02	0.043**
	Familiarity with Excel	−3.47066	2.841902	−1.22	0.222
	Familiarity with Word	−0.464434	1.602276	−0.29	0.772
	Familiarity with PPT	5.429209	2.993256	1.81	0.07
	Familiarity with programming languages	1.687129	1.615284	1.04	0.296
	Familiarity with EViews	−0.279231	1.395436	−0.2	0.841
	Familiarity with SPSS	3.77915	2.966766	1.27	0.203
	Familiarity with STATA	−3.538309	2.603588	−1.36	0.174
	Familiarity with R	−3.209315	1.945008	−1.65	0.099
	Familiarity with Python	−0.3581015	1.784474	−0.2	0.841
	Confidence in using ideal class room teaching methods	−7.776851	3.398149	−2.29	0.022**
	Confidence in teaching focussed group discussion practically	3.446212	2.070211	1.66	0.096
	Confidence in teaching literature review	5.275792	3.117175	1.69	0.091
	Confidence in teaching triangulation	9.099634	4.090585	2.22	0.026**
	Confidence in teaching online data searching	6.110049	3.158014	1.93	0.053**
	Confidence in teaching participatory learning methods	−1.09917	1.851196	−0.59	0.553
	Confidence in teaching sampling methods	2.029075	2.089557	0.97	0.332
	Confidence in teaching E-library	−7.376033	4.121743	−1.79	0.074
	Confidence in teaching research design	1.55469	2.22235	0.7	0.484
	Confidence in teaching writing research article	11.83065	5.437597	2.18	0.03**
	Confidence in teaching hypothesis testing	−5.662898	3.091315	−1.83	0.067
	Confidence in teaching lifelong learning	−2.554142	2.8163	−0.91	0.364
	Confidence in teaching interview schedule	−1.403675	2.881206	−0.49	0.626
	Confidence in teaching qualitative research methods	−0.942496	1.708149	−0.55	0.581
	Confidence in teaching measures of dispersion	−0.8236555	2.32954	−0.35	0.724
	Confidence in teaching basics of SPSS	−0.323518	2.683554	−0.12	0.904
	Confidence in teaching statistical inference	6.043327	4.247285	1.42	0.155
	Confidence in teaching parametric and nonparametric tests	−3.616675	2.639435	−1.37	0.171
	Confidence in teaching chi-square tests	−9.87428	4.775233	−2.07	0.039**
	Confidence in teaching basics of regression	11.2584	4.935429	2.28	0.023**
	Confidence in teaching *f-test*	−4.967383	3.111096	−1.6	0.11
	Confidence in teaching t-test	−0.1499057	2.103385	−0.07	0.943
	Confidence in teaching measures of central tendency	4.613436	2.643146	1.75	0.081
	Confidence in teaching composition of research article	−1.333988	2.454928	−0.54	0.587
	Confidence in teaching ethics	−2.870499	3.172047	−0.9	0.365
	Improvement in research quality	11.46919	4.746221	2.42	0.016**
	Efficacy of online assignments	2.360038	1.700733	1.39	0.165
	_cons	−18.4386	9.103093	−2.03	0.043**

Note(s): ** Significant at 5%

Table 5.
Coefficient, standard error and along with ρ values of the binomial logistic regression model

The online workshop seems to have left much to be desired in context of inculcating confidence among faculties in using empirical tools.

Through the third regression model, an attempt was made to understand the perceived improvement in the teaching perception of faculties in the backdrop of the concepts taught in the faculty development program. The coefficients of dependent variables across the tested categories are summarized in Table 4.

From Table 4, we can observe that faculties with higher qualification ($P > z = 0.01$) and greater familiarity with advanced statistical packages ($P > z = 0.024$) believe that the concepts which were taught in the workshop helped in enhancing their teaching skills. Among the concepts taught, the faculties felt that qualitative methods like classroom teaching methods ($P > z = 0.001$), online data searching ($P > z = 0.05$) and e-library training ($P > z = 0.015$) would enhance their teaching capability. Among statistical tools, the faculties believed that measures of central tendency ($P > z = 0.005$) would enhance their teaching capability. From the regression model, we could observe that faculties were able to understand theoretical concepts relatively easily as compared to empirical concepts. Furthermore, even among empirical concepts, they were confident in learning measures of central tendency ($P > z = 0.005$), which was of very basic level. As far as statistical packages were concerned, faculties believed that being familiar with SPSS had an inverse relationship in their perceived improvement of their teaching capabilities. This may be attributed to two reasons. On the one hand, the syllabus which most of these graduate faculties are teaching is deprived of statistical packages. Even if these faculties were to teach statistical packages, due to obvious time constraints, they would not be able to complete their formally assigned syllabus on time.

The objective of the fourth regression model was to evaluate the confidence inculcated by CBP among faculties to practically teach research and econometric concepts to their students. The coefficients of dependent variables across the tested categories are summarized in Table 5.

From Table 5, we can observe that, according to faculties, using a combination of English and regional language was seen as an effective medium of instruction ($P > z = 0.026$). It is interesting to note that the faculties were confident to teach triangulation methods ($P > z = 0.026$), online data searching ($P > z = 0.05$), composing research article ($P > z = 0.03$) and basics of regression ($P > z = 0.023$) for their students. From this observation, we can note that the concepts which the faculties felt that they could confidently teach their students were simple in nature or were concepts which they were already familiar with, like basics of regression. When it came to new technical concepts and statistical tools like chi-square test, faculties did not feel confident in their ability to teach the same to their students ($P > z = 0.039$). When it came to implementation of idealistic teaching methods in classroom, given the time constraint, faculties felt that it would be not be of much practical use.

5.2 Results pertaining to estimated predicted probability of success

Table 6 helps us in understanding the estimated predicted probability of first regression model.

From Table 6, it is interesting to observe that the familiarity that the faculties have with power point presentation was enhancing their understanding of the concepts thought in econometric workshop by 11.8%. Further, the familiarity that the faculties had of python was able to boost their understanding of the concepts taught in the workshop by 57.5%. Hence, we can observe that the faculties who were familiar with advanced statistical packages were more adept in understanding the research concepts which were taught in the workshop. In addition to that, their familiarity with basic computer software seems to be sufficient but not necessary condition in enhancing their understanding.

Table 6.
Results of estimated probability of success among statistically significant independent variables used in regression model 1

Variables	Coefficients	Expectations												
C	−8.978	1	1	1	1	1	1	1	1	1	1	1	1	1
Highest qualification	1.537	0	1	1	2	2	2	2	2	2	2	2	2	2
English	2.378	0	0	1	1	1	1	1	1	1	1	1	1	1
Familiarity with PPT	3.011	0	0	0	0	1	2	3	3	3	3	3	3	3
Familiarity with Python	2.824	0	0	0	0	0	0	0	1	2	3	3	3	3
Qualitative method taught	3.849	0	0	0	0	0	0	0	0	0	0	1	1	1
Regression basics taught	−5.455	0	0	0	0	0	0	0	0	0	0	0	1	1
Online assignment	2.708	0	0	0	0	0	0	0	0	0	0	1	0	1
Predicted probability		*7.34 e-07*	*3.41 e-06*	*5.25 e-05*	*1.71 e-05*	*3.0 e-04*	*0.007*	*0.125*	*0.70*	*0.97*	*0.998*	*0.999*	*0.992*	*0.999*

In Table 7, estimated predictive probability of second regression model has been summarized.

From Table 7, we can observe that the predicted probability of success initially improved by 47% when the triangulation method was introduced and further improved by 48% when online data surfing was introduced. This reflects that the faculties were confident in using the triangulation method and online data surfing in their active research. It is interesting to observe that the CBP did not instill confidence among faculties in using statistical tools for doing empirical analysis in their active research.

In Table 8, estimated predictive probability of third regression model has been summarized.

From Table 8, we can observe that faculty's knowledge about advanced statistical package was able to enhance their theoretical understanding of teaching concepts by 15%. However, concepts related to classroom teaching had 68% influence in improving faculties' perceived ability to teach better.

The magnitude of the impact of statistically significant independent variables on the dependent variable of fourth regression model in terms of improving predictive probability of favorable outcome has been summarized in Table 9.

From Table 9, we can observe that among the independent variables impacting the efficacy of teaching among faculties, only basics of regression had the highest weightage (91%). The above observation implies that although concepts like triangulation methods, online data searching and composing research articles were thought to be useful by the

Table 7.
Results of estimated probability of success among statistically significant independent variables used in regression model 2

Variables	Coefficients	Expectations						
C	−8.125	1	1	1	1	1	1	1
Highest qualification	1.464	0	1	1	2	2	2	2
English	2.482	0	0	1	1	1	1	1
Confidence in triangulation	3.700	0	0	0	0	1	1	1
Confidence in online data surfing	3.564	0	0	0	0	0	1	1
Online assignment	3.938	0	0	0	0	0	0	1
Predicted probability		0.0001	0.0004	0.0055	0.0237	0.4958	0.97	0.99

Variables	Coefficients	Expectations											
C	−9.392	1	1	1	1	1	1	1	1	1	1	1	1
Highest qualification	1.410	0	1	2	2	2	2	2	2	2	2	2	2
Electricity	2.532	0	0	0	1	1	1	1	1	1	1	1	1
Familiarity with Python	2.013	0	0	0	0	1	2	3	3	3	3	3	3
Classroom methods taught	3.251	0	0	0	0	0	0	0	1	1	1	1	1
Online data searching taught	2.171	0	0	0	0	0	0	0	0	1	1	1	1
E-lib training taught	2.473	0	0	0	0	0	0	0	0	0	1	1	1
Taught SPSS	2.898	0	0	0	0	0	0	0	0	0	0	1	1
Taught measures of central tendency	2.930	0	0	0	0	0	0	0	0	0	0	0	1
Predicted probability		2.01 e-06	8.23 e-06	3.37 e-05	0.0004	0.003	0.023	0.15	0.821	0.97	0.997	0.963	0.997

Table 8.
Results of estimated probability of success among statistically significant independent variables used in regression model 3

Variables	Coefficients	Expectations										
C	−18.4386	1	1	1	1	1	1	1	1	1	1	1
Combination of English and regional language	5.685312	0	1	1	1	1	1	1	1	1	1	1
Network quality	−3.895	0	0	1	1	1	1	1	1	1	1	1
Electricity	3.347689	0	0	0	1	1	1	1	1	1	1	1
Ideal class room teaching	−7.77685	0	0	0	0	1	1	1	1	1	1	1
Teaching triangulation	9.099634	0	0	0	0	0	1	1	1	1	1	1
Teaching online data	6.110049	0	0	0	0	0	0	1	1	1	1	1
Teaching composing research article	11.83065	0	0	0	0	0	0	0	1	1	1	1
Teaching chi-square test	−9.87428	0	0	0	0	0	0	0	0	1	1	1
Teaching basics of regression	11.2584	0	0	0	0	0	0	0	0	0	1	1
Perceived improvement in research quality	11.46919	0	0	0	0	0	0	0	0	0	0	1
Predicted probability		*6.18 e-13*	*1.82 e-10*	*3.70 e-12*	*1.05 e-10*	*4.42 e-14*	*3.95 e-10*	*1.78 e-07*	*0.023*	*1.26 e-06*	*0.088*	*0.99*

Table 9.
Results of estimated probability of success among statistically significant independent variables used in regression model 4

faculties in improving their practical teaching, the magnitude of their impact were negligible in terms of enhancing the research capability of faculties. When it came to practical teaching, faculties genuinely felt that only regression was useful. Furthermore, faculties believed that inculcating ideal classroom teaching techniques would have had detrimental effects in practical teaching–learning pedagogy. This observation could be justified on the grounds that faculties would have been under tremendous pressure of completing their assigned portions on time. This pressure, coupled with uneven students-to-teacher ratio, would have adversely affected the faculties in their endeavor of inculcating innovative and learner-centric teaching techniques. This is more so true, given how ill trained the faculties are, and how ill equipped most of the educational institutions in Karnataka are, to inculcate innovative teaching-learning methods.

6. Conclusion

The Indian education system is in a transition phase. Not only in India but also most of the developing world's education system is transitioning form teacher-centric education system to student-centric education system. The advent of COVID-19 has acted as a catalyst for the same. To inculcate an education system which would facilitate to bridge the gap between industry and academia, there are two things which must be done simultaneously. To begin with, a mechanism should be put in place to regularly update and restructure the syllabus to meet the needs and aspirations of industry and society. Simultaneously, in higher educational institutions, another system should be put in place, through which faculties are regularly trained and retrained in their domains so as to enable them to do justice to their duty. In training the faculties with state-of-the-art techniques and developments, online platforms have an increasingly important role to play. In this backdrop, our research concludes that the medium of instruction has an important role to play in enhancing the efficacy of such workshops in the Indian context. Although faculties were able to understand theoretical concepts, they found themselves at unease when technical concepts were taught in the online CBP. From the inferences of our study, our intention is not to downplay the efficacy of online CBPs in teaching statistical or empirical tools. On the contrary, what our study wants to reiterate is although online workshops can be used to teach theoretical concepts in traditional format, the same cannot be said with regards to teaching technical concepts and statistical packages. What we want to point out is that an innovative and proactive approach should be inculcated in CBPs if they want to serve their purpose. It was a bit ironical that, faculties felt, knowledge of chi-square test was detrimental to their research. This reflects as to how poorly such technical concepts were taught in the workshop. This also reflects a need to revamp the way in which technical concepts are taught in online CBPs. Proactively engaging the audience to have an interactive session would be a good place to start. The importance of quantitative and qualitative tools cannot be dismissed in the realm of social sciences. By using the predicted probability model, our study was able to ascertain that quantitative and empirical tools play an important role in enhancing the teaching and learning capability of faculties. Hence, although online workshops can play an important role in promoting the learning capability among faculties, it has its own unique limitations, which requires to be tackled with innovation and unconventional approach.

7. Implications of the study

(1) Through our study, we were able to statistically ascertain that faculties who were more fluent in English were able to understand and practically use the learnt concepts with greater ease in their research. To facilitate greater collaboration among academia in a multilinguistic country like India, using English as the medium of collaboration and cooperation seems to be a step in right direction. Most of the faculties who participated in our study were using regional language as a medium of instruction in their respective educational institutions, which seems to have adversely affected their fluency in English. Hence in this backdrop, efforts must be undertaken to promote teaching and learning with English and regional language, particularly in government-run institutions.

(2) In the workshop, an effort was made to teach theoretical and empirical concepts to faculties. However, our empirical inferences reveal that although faculties were able to develop theoretical understanding of qualitative concepts, contribution of the same in enhancing their practical research was rather limited. Furthermore, when it came to statistical and empirical tools, like chi square and regression, the faculties does not seem to have understood the concepts at all. Online CBPs must be designed in such a

manner that statistical packages are used to teach statistical and empirical tools. Teaching must be practically relevant. In addition to it, a systematic and meticulous record of operating and using of statistical tools should be maintained and provided to participants after the end of workshop for the purpose of revision.

(3) Our study was able to ascertain that faculties' expertise in research significantly contributed to enhance their teaching capability. Furthermore, with regards to teaching–learning pedagogy, faculties found inculcating advanced statistical packages and new empirical concepts to their graduate and postgraduate students visibly detrimental. This was so because these concepts are not part of their assigned syllabus, particularly for courses belonging to humanities. In this regard, for the benefit of all stakeholders, the government must ensure that the mandate of practically relevant research-oriented teaching is not only confined to university faculties but is also equally applicable for graduate and postgraduate faculties working in colleges. Promoting research in wholistic manner in colleges at both graduate and postgraduate level is not only going to help in making faculties better teachers but shall bring in practical perspectives in teaching. Hence, inculcating this approach shall go a long way in bridging the gap between academia and industry.

8. Contribution

Our study reascertains the importance of research in enhancing teaching capability of faculties. It is also to be noted that, through CBP, faculties were able to grasp theoretical concepts relatively easily as compared to empirical concepts. Hence, the ICSSR-funded online CBPs must have a refined approach in teaching empirical concepts in online platform as has been illustrated in our implications.

9. Limitations

The online capacity building program is a novel initiative which has started to gain prominence among Indian academia in recent years. Hence, while constructing our model, we could not incorporate systematic random sampling as our population's size was small and obscure. Hence, we collected data from participants who attended one such ICSSR sponsored 12-day online capacity building program.

The inferences from our study could not be generalized, as not all faculties' viewpoint could be represented by just one such online workshop. Repeated cross-sectional studies involving various regions and states of India are going to provide a better understanding about the efficacy and efficiency of ICSSR-sponsored online CBPs in enhancing teaching and research capability of faculties belonging to social sciences.

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