Research Article

STATISTICAL REVIEW OF RECENT TRENDS IN TEACHING LEARNING OF MATHEMATICAL SCIENCES

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Abstract

Education plays a very important role in any human being's life. This paper focuses on the teaching learning methods in today's competitive world. It will highlight the need for simultaneous application of C and E learning. This paper discusses recent trends in the teaching –learning process of Mathematical Sciences. The paper intends to convey benefits of such innovative methods in students learning process and in generating interest in the subjects of Mathematics and Statistics. In order to create an eager and overall positive attitude about the subject among students we have discussed its applications in day-to-day life with the help of a few case studies.

Keywords: Binary logistic regression, Graphical techniques, ICT tools, Factor analysis.

I. INTRODUCTION

Education plays a very important role in any human being's life. In today's competitive world, while dealing with higher education it is not just sufficient to rely on classroom teaching learning, but beyond that we need to be global. Involvement of innovative technology should be a part of this process. New methodology and tools should be an integral part of higher education. Online learning opportunities can broaden the era of higher education and from any part of the world best can be learn.

II. Fundamentals of Mathematical sciences

Application of Innovative methods in teaching-learning process:

METHODOLOGY

A survey of 150 students of Degree College studying Mathematics and Statistics was carried out in which they responded to some questions regarding the current teaching methods, their approach towards these subjects, their interest, and their need for learning this subject and changes they expect in current teaching strategy.

III. Contemporary teaching methods vs Traditional methods

i) Chi square test of independence of attribute:

H_0: Student's interest in learning mathematics is independent of teaching methods.
H_1: not H_0

Teaching method	Interested	Not interested	Total
Traditional approach	10	9	19
Contemporary approaches	120	11	131
Total	130	20	150

	value	df	Asymp.sig.(2-sided)
Pearson's chi-square	21.80904	1	0.0000

Since P value <0.05 Reject H_0,

Student's interest in learning mathematics is depends on teaching method

ii) **To check whether different teaching methods are significantly different than each other we had set hypothesis:**

Survey of 52 undergraduate and post graduate students studying Mathematical-sciences carried out regarding teaching methods and student's expectation and their performance in the exam**.**

H_0: Students performance is equal for different teaching methods. (Distance education, chalk duster method, virtual classroom)

H_1: There is significant difference between various teaching methods

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	53.939	2	26.969	57.11576	0.0001	3.186582
Within Groups	23.137	49	0.472			
Total	77.076	51				

As p<0.05 reject H_0 that indicates student performs is depend on teaching methods.

IV. Factors that affects student's performance in the Exam

Factor Analysis:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.352
Bartlett's Test of Sphericity	Approx. Chi-Square	456.304
	df	276
	Sig.	.000

As p value <0.05 there is significant correlation between various variables hence factor analysis can be used to extract factors that affects student performance

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					Factors					
Variables	1	2	3	4	5	6	7	8	9	10
Subject Content	0.650	0.214	0.224	0.155	0.378	0.088	0.315	-0.104	-0.185	0.056
Students liking towards subject	0.770	-0.098	-0.153	0.029	0.234	0.109	-0.105	0.206	0.079	0.087
Simple and easy way of teaching	0.808	0.154	0.085	0.139	0.001	0.033	0.051	-0.022	0.080	-0.119
Assignment ,Home work practical completion sincerity	0.119	0.649	-0.138	0.052	-0.090	0.175	-0.014	0.178	0.111	0.427
Study environment at college class	0.035	0.812	0.131	-0.189	0.267	-0.037	0.093	-0.108	0.156	-0.020
Phobia towards subject	-0.047	0.880	0.196	0.140	0.040	0.010	0.114	0.023	0.027	0.102
Format of question paper subjective	-0.024	0.004	0.802	-0.061	0.056	-0.067	0.011	0.050	-0.076	0.253
Classroom environment	0.066	0.082	0.610	0.142	0.161	0.182	0.112	0.386	0.098	-0.353
N/S study material	-0.031	0.272	-0.154	0.807	0.112	0.108	-0.093	0.071	0.047	0.125
Syllabus depth	0.248	-0.223	0.108	0.846	-0.017	0.002	0.049	-0.031	0.141	0.014
ICT tools used like smart board	0.185	0.098	-0.073	-0.059	0.850	0.075	-0.032	0.191	-0.096	-0.026
Teacher's knowledge about subject	0.128	0.036	0.256	0.340	0.619	0.150	0.034	0.195	0.231	0.025
Career prospective point of view	0.165	-0.018	0.009	0.215	0.038	0.742	0.235	0.313	0.123	-0.129
Real life application	0.078	-0.046	0.089	-0.060	0.197	0.840	0.121	-0.190	-0.055	0.115
Chalk and duster method	-0.087	0.002	-0.094	-0.047	-0.216	0.089	0.888	0.096	-0.006	0.069
Group Studies .	0.194	0.046	0.151	0.015	0.364	0.164	0.691	-0.086	-0.059	0.089
Teacher's intraction doubt solving easily approachable	-0.048	0.001	0.208	-0.018	0.109	-0.038	-0.033	0.858	-0.031	0.086
Encouregement and motivation by teachers	0.405	0.215	-0.143	0.120	0.308	0.060	0.083	0.632	-0.047	-0.058
Study environment at home	-0.005	0.244	0.055	0.289	-0.054	0.093	-0.109	0.021	0.847	0.016
Atentive ness in lecture	0.167	0.102	0.062	0.420	0.018	-0.263	-0.057	0.153	-0.118	0.798

Thus there are 10 factors which affects student's performance: 1) Positive attitude towards subject 2) Sincerity & Decency 3) Students active participation in class 4) Exam orientated comfort 5) Teacher's active n innovative participation 6) Practicability of subject 7) Mutual understanding about subject 8) Teacher's central roll 9) Study environment at home 10) Appropriateness

V. Contemporary teaching methods: We can adopt few innovative methods in order to enhance student's interest towards subject

- Case studies, Projects
- Application based learning (PBL)
- Presentations group discussion by students
- Encouragement by organization of quiz, games,

VI. ICT tools

Model building: Now we can fit the BINARY LOGISTIC REGRESSION model to the data with 10 independent variables to predict probability of teachers are positive and satisfied about ICT tools application to find factors which encourage use of ICT tools.

Our dependent variable y is binary

y=1 if teacher is satisfied and positive about ICT tools
y=0 if teacher is unsatisfied and negative about ICT tools
Binary logistic model: =Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	teaching	.410	.630	16.193	1	.00516	1.506
	Fig,dig	.231	.439	.007	1	.0598	.793
	Demo	.781	.464	82.530	1	.023	2.183
	Interaction	.178	.643	51.348	1	.000	1.195
	Accumulation of resources	1.293	.708	28.486	1	.038	3.645
	cost	-.459	.511	.089	1	.000369	.632
	class activity	.142	.408	.257	1	<0.0001	1.152
	skills	.144	.437	.175	1	.0742	1.155
	Authenticity and reliability of resource	-1.562	.631	10.569	1	.013	4.770
	teamwork	-.679	.572	1.410	1	.0235	.507
	class strength	-.346	.374	.855	1	.0355	.707
	Constant	10.016	5.074	3.897	1	.048	.000

Negative estimates indicates that presence of variable decreases chance of use of ICT and teacher is Satisfied

Classification Table[a]					
Observed			Predicted		Percentage Correct
			ICT use		
			no	yes	
Step 1	ICT use	no	11	7	61.1
		yes	5	21	80.8
	Overall Percentage				72.7
a. The cut value is .500					

As 72.7% of people were correctly classified, hence model is 72.7% accurate. The addition of explanatory variables increases the percentage of correct classification significantly

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	10.817	8	.212

Model is good fit as p-value>0.05

Fitted Model is

$\ln(p/1-p)$=10.016+0.41*teaching+0.231*(fig,dig)+

0.781*(demo) + 0.178*Interaction +1.293*Accumulation of resources-0.459*cost+0.142*class activity+0.144*skills-1.562 Authenticity and reliability of resource-0.679*teamwork-0.346*class strength

**Positive estimate** indicates that presence of variable increases chance of use of ICT and teacher is Satisfied.

As we have fulfilled all the objectives using several statistical techniques; based on that we have drawn conclusions.

Significant factor affecting use of ICT tools

- Teaching of Complicated concepts and topic
- Ease of presentation of fig, dig, charts, graph
- Live demo of concepts
- Mutual interaction while explanation
- Accumulation of resources cost
- Effective planning of class room activity
- Development of sufficient potentials and skills among student
- Authenticity and reliability of resource
- Team work and sharing knowledge
- Class strength

VII. Online learning opportunities

In recent years, especially COVID-19pandamic makes realization of importance of online teaching learning here are the few views of our student regarding online teaching learning opportunities.

Advantages of online Courses
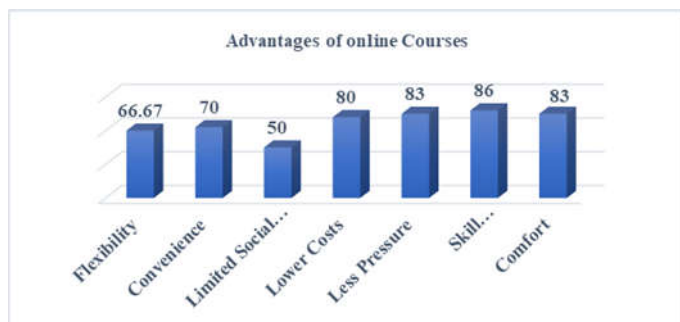
Conclusion

- We shall be happy if we can teach our course using these Methods and also introduce the methods to our colleagues.
- We shall be very happy if these methods can improve the undergraduate and post graduate mathematics teaching.
- Thus blend of new and traditional ways will surely create significant milestone in journey of students as well as eachers life. Let's hope for the best.

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