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Contents

Research Potential and Competitiveness of Indian Institutes of Technology : a Scientometric assessment

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Abstract :

This study is aimed to find out the research competitiveness of the top five IITs of India. The study explores the research thrust areas of the top five IITs of India, the total productivity, citation count, subject-specific research, and publication preferences. This study is done to find out the pattern of research and the comparative analysis of the top 5 IITs of India so that the comparative performance can be measured owing to huge investments made for the IITs by the Government of India. This study gives a comparative scientometric assessment of a total of 7602 publications contributed by the five institutions. The study is based on the data harvested from the Indian Citation Index from 2004 to 2018 using the data comparer functionality. In this study, it's found that IIT Kharagpur has contributed the highest number of research publications followed by IIT Roorkee, IIT Delhi, IIT Madras, and IIT Bombay. The study found that chemistry is the common preferred subject for all the institutions with a total publication of 716 and it also tops the rank. Highlighting the research potentiality of IITs this study brings forth the original scenario of research works in those esteemed institutions.

Keywords :

Indian Citation Index, Indian Institute of Technology (IIT), Institutional Productivity, Scientometric Analysis

1. Introduction :

Of many indicators, research performance is one of the important indicators

of an institution to evaluate its qualitative as well as quantitative makeup. Institutions like IIT's are expected to excel in research and technology for the better development of the nation. And a comparative scientometric analysis can give a clear picture of the research trends and their impact which may be helpful in a positive competition and appraisal. This study is an endeavor to find out the competitive performance of the top 5 IITs of India based on the data harvested from the Indian Citation Index (ICI), India's largest indexing database, which indexes more than 1000 Indian Journals (http://www.indiancitationindex.com/ici.aspx). The IITs under study are considered as the premier institutions in the country and also happen to be the top five IIT's in terms of research productivity. This study is limited to the analysis of research productivity for the period of 2004-2018 and the publication recorded only in the Indian Citation Index database. The scope of this study is limited to the top five IIT's of India which contributed the highest no of publications as recorded by the Indian Citation index.

About the institutions : of the five IITs under study **IIT Kharagpur** is the first such institution established in India in 1950 and is named after the village Kharagpur, (http://www.iitkgp.ac.in). **IIT Roorkee** is one of the old institutions in India established in 1847 though the institution was granted the status of IIT in 2001 becoming the 7th IIT of India (https://www.iitr.ac.in). **IIT Delhi** is the 5th IIT established in India and was formally inaugurated as IIT in 1961 (http://www.iitd.ac.in). **IIT Madras** was established way back in 1959 under an Indo-German agreement. IIT Madras is the 3rd IIT established after IIT Kharagpur and IIT Bombay (https://www.iitm.ac.in/). **IIT Bombay** was established in 1958 as the 2nd IIT of India after IIT Kharagpur (http://www.iitb.ac.in).

2. Review of related literature :

The publishing trend of DJLIT was studied and found that 227 papers were produced in five years from 2013-2017. The authors found that the highest number of papers (111 out of 227) is two authored papers followed by single-authored papers. The study also found that the highest number of publications appeared on the subject of scientometric and bibliometric followed by Webometric studies**(Batcha, & Ahmad, 2018)**. Another study assessed that the publication productivity on e-learning and found that out of a total of 11948 documents, 6187

(51.78%) were published as conference papers followed by articles. The highest publication came from UK followed by the USA.**(Amanullah&Khiste 2018)**.Ascientometric study of computer science research of two renowned IITs found that both the institutions preferred conference papers (65.27%) for communicating their research outcome **(Pradhan& Ramesh, 2018).** In anotherbibliometric assessment of Gujrat University found that most of the authors preferred Poland and New Zealand-based Journals for publishing their research work and most of the publications appeared in the form of articles. **(Kumar, Dora, & Desai, 2015)**.The study on publication productivity of IIT Delhi found that 93.812 % of the publications appeared as articles and the rest around 6% appeared in 9 other different forms. The authors explored that engineering is the most interesting area of research contributing to 30.938% of publications and the Journal of Applied Polymer Science is the preferred journal for publication **(Chaurasia&Chavan, 2014)**. A study made to analyze the scholarly production of IIM Ahmadabad showed that a total of 318 research publications are indexed in Scopus while 234 research publications are indexed in Web of Science. 2009 and 2010 showed good growth in the publication productivity of IIM Ahmadabad. **(Kumar & Dora, 2012)**. In another scientometric analysis of 5 IISER's found that most of the research output is collaborative work of 3 authors and IISER Kolkata (oldest institution) has the highest total publication per capita followed by IISER Mohali**(Solanki, Uddin, & Singh, 2016)**. Another investigation showed that the research output of 6 IIT's and found that 72940 publications were produced during the study period and the highest contribution was made by IIT Kharagpur **(Pradhan& Ramesh, 2018)**.

3. Objectives of the Study :

The study focuses on the comparison of the top five IITs of India. The study is carried out with the following objectives:

i). To find out a comparative map of the total productivity of the IITs under study.

ii). To get a comparative outline of the percentage of articles cited and citations received.

iii). To identify the thrust area of research for each institution and comparison.

iv). To make a comparative analysis of journal preference.

v). To compare the document type preferred for publishing.

The above objectives of this study are set to find out the overall comparative performance of the said institutions and to specifically find out whether there is a similarity pattern of scientific publications in terms of citations, journal preference, and subject specialty.

4. Methodology :

With the advent of technology, the indexing and abstracting databases are paving way for qualitative and quantitative analysis of the institutions. The current study is based on the data harvested from the Indian Citation Index (ICI). The data is drawn from the database using its "data comparer" functionality. Firstly a thorough investigation was done to know the productive IITs and then the top 5 IITs were taken for the study. To attain the above-laid objectives the "data comparer" functionality of ICI is used so that data can be harvested and interpreted accordingly. The analysis and data interpretation is done accordingly using MS Excel and MS Word to get results according to the laid objectives of the study.

5. Findings and discussion:

The study presents the following findings along with discussion.

Table 1 :Comparative analysis of year wise growth of research publications

Sl. No.	Year	IIT Kharagpur	IIT Roorkee	IIT Delhi	IIT Madras	IIT Bombay
1	2004	136	111	128	88	68
2	2005	151	121	115	95	73
3	2006	132	108	136	98	90
4	2007	165	113	119	83	95
5	2008	122	128	107	112	69
6	2009	120	106	114	85	85
7	2010	127	139	115	97	83
8	2011	103	110	127	115	78
9	2012	117	112	101	96	81

10	2013	97	127	124	89	71
11	2014	110	109	107	90	90
12	2015	119	93	108	95	103
13	2016	133	133	94	95	96
14	2017	119	96	87	91	74
15	2018	37	34	38	28	41
	Total	**1788**	**1640**	**1620**	**1357**	**1197**

Table 1 indicates the research performance of the five institutions chronologically. The authors of the five institutions have contributed a total of 7602 research publications from 2004 to 2018. Of the five institutions, IIT Kharagpur has produced the highest number of publications followed by IIT Roorkee, IIT Delhi, IIT Madras, and the least by IIT Bombay. 2007 with 165 publications for IIT Kharagpur, 2010 with 139 publications for IIT Roorkee, 2006 with 136 publications for IIT Delhi, 2011 with 115 publications for IIT Madras, and 2015 with 103 publications for IIT Bombay remained the most productive years for the institutions.

Table 2 :Comparative analysis of citations received chronologically

Sl. No	Year	IIT Kharagpur		IIT Roorkee		IIT Delhi		IIT Madras		IIT Bombay	
		TNP*	TNC#	TNP	TNC	TNP	TNC	TNP	TNC	TNP	TNC
1	2004	136	118	111	87	128	178	88	53	68	55
2	2005	151	128	121	141	115	156	95	65	73	82
3	2006	132	146	108	74	136	189	98	42	90	71
4	2007	165	132	113	84	119	173	83	27	95	39
5	2008	122	80	128	104	107	119	112	59	69	47
6	2009	120	109	106	79	114	148	85	28	85	45
7	2010	127	79	139	62	115	100	97	37	83	71
8	2011	103	46	110	35	127	143	115	60	78	50

9	2012	117	70	112	78	101	123	96	19	81	55
10	2013	97	40	127	60	124	59	89	29	71	23
11	2014	110	24	109	60	107	50	90	8	90	19
12	2015	119	22	93	25	108	79	95	10	103	23
13	2016	133	9	133	24	94	10	95	6	96	14
14	2017	119	3	96	5	87	15	91	1	74	2
15	2018	37	0	34	0	38	0	28	0	41	1
	Total	**1788**	**1006**	**1640**	**918**	**1620**	**1542**	**1357**	**444**	**1197**	**597**

*TNP=Total Number of Publications

#TNC= Total number of Citations.

Table 2 depicts the citations received per year by the institutions. The comparison analysis reveals that IIT Delhi has got the highest number of citations though it ranks 3rd in publication productivity. IIT Kharagpur and IIT Roorkee follow IIT Delhi. The highest citation received in a single year is 146 (2006) for IIT Kharagpur, 141 (2005) for IIT Roorkee, 189 (2006) for IIT Delhi, 531 (2004) for IIT Madras, and 82 (2005) for IIT Bombay.

Table 3 :Comparative analysis of articles cited year wise for the period of study

Sl. No	Year	IIT Kharagpur		IIT Roorkee		IIT Delhi		IIT Madras		IIT Bombay	
		Articles published	Articles cited	Articles published	Articles cited	Articles published	Articles cited	Articles published	Articles cited	Articles published	Articles cited
1	2004	136	47	111	39	128	61	88	25	68	24
2	2005	151	38	121	45	115	47	95	28	73	17
3	2006	132	48	108	30	136	53	98	26	90	30
4	2007	165	46	113	38	119	47	83	15	95	22
5	2008	122	42	128	35	107	43	112	30	69	20
6	2009	120	44	106	44	114	46	85	17	85	25
7	2010	127	38	139	30	115	39	97	18	83	26
8	2011	103	27	110	24	127	46	115	30	78	21

9	2012	117	32	112	29	101	46	96	15	81	26
10	2013	97	27	127	31	124	30	89	20	71	15
11	2014	110	21	109	27	107	25	90	7	90	11
12	2015	119	20	93	18	108	27	95	8	103	19
13	2016	133	9	133	18	94	6	95	4	96	9
14	2017	119	3	96	4	87	8	91	1	74	2
15	2018	37	0	34	0	38	0	28	0	41	1
	Total	**1788**	**442**	**1640**	**412**	**1620**	**524**	**1357**	**244**	**1197**	**268**

Table - 3 gives a comparison of the year-wise publications cited. Of a total of 1788 publications, as many as 442 (24%) publications are cited for IIT Kharagpur, of 1640 publications 412 (25%) are cited for IIT Roorkee, of 1620 publications 524 (32%) cited for IIT Delhi which is the highest among the five institutions, of 1357 publications 244 (17%) cited for IIT Madras and of total 1197 publications 268 (22%) is cited for IIT Bombay. The data reveals that IIT Delhi tops this list with 32% of the total publication being cited.

Table 4 :Comparative analysis of top ten preferred journals

Sl. No.	IIT Kharagpur		IITRroorkee		IIT Delhi		IIT Madras		IIT Bombay	
	Journal (Jr.)	articles	Journal (Jr.)	articles	Journal (Jr.)	articles	Journal (Jr.)	articles	Journal (Jr.)	articles
1.	Current Sc.	**89**	Current Sc.	**75**	Current Sc.	**62**	Current Sc.	**37**	Current Sc.	**91**
2.	Bulletin of Materials Sc.	**39**	IETE Jr. of Research	**32**	Defence Science Jr.	**35**	Indian Chemical Engineer	**32**	Indian Geotechnical Jr.	**29**
3.	Indian Jr. of cryogenics	**43**	Indian Concrete Jr. (the)	**32**	EPW	**54**	Indian Concrete Jr (the)	**61**	Indian Jr. of Cryogenics	**46**
4.	Indian Jr. of Physics	**27**	Indian Geotechnical Jr	**33**	Global Jr. of Flexible Systems Management	**83**	Indian Geotechnical Jr	**45**	Jr. of Chemical Sc	**62**
5.	Jr. of Earth System Sc.	**32**	Indian Highways	**67**	IETE Jr. of Research"	**62**	Indian Jr. of Chem – "sec-a: inorganic, bio-inorganic, physical, theoretical & analytical"	**41**	Jr. of Earth System Sc.	**62**

6.	Jr. of Food Sc. and Technology"	48	Jr. of Geological Society of India	51	Indian Jr. of Fibre& Textile Research	171	Jr. of Aerospace Sc. and Technologies	40	Jr. of Geological Society of India	46
7.	Jr. of Geological Society of India	43	Jr. of Scientific & Industrial Research	36	Jr. of chemical Sc.	30	Jr. of chemical Sc.	49	Jr. of Chemical Sc	25
8.	Jr. of Mines Metals & Fuels	42	Jr. of Structural Engineering	37	Jr. of Scientific & Industrial Research	68	Jr. of Structural Engineering	96	Pramana-Jr. of Physics	32
9.	Sadhana - Academy Proceed in Engineering Sc.	36	Jr. of the Indian Society of Remote Sensing	35	Proceed. of the Indian National Sc. Academy - part a: Physical Sc.	38	Sadhana - Academy Proceed in Engineering Sc.	45	Sadhana - Academy Proceed in Engineering Sc.	41
10.	Transactions of the Indian Institute of Metals	50	Transactions of the Indian Institute of Metals	46	Sadhana - Academy Proceed in Engineering Sc	32	Transactions of the Indian Institute of Metals	118	Transactions of the Indian Institute of Metals	33

Table 4 shows the top ten most preferred journals with a minimum of 25 articles per journal for each institution. The data suggest that as many as 28 different journals appear in the top ten most preferred publication platforms of the five institutions under study. Current Science is the only Journal that is common to all the five institutions. Of all the journals, the Indian Journal of Fiber & Textile Research carries the highest number of articles (171) contributed by IIT Delhi and is followed by the journal Transactions of the Indian Institute of Metals which carry 118 articles contributed by IIT Madras. For IIT Kharagpur 449 (25.11% of the total publications), for IIT Roorkee 444 (27% of the total publications), for IIT Delhi 635 (39.20% of the total publications), for IIT Madras 564 (41.57% of the total publications) and IIT Bombay 467 (39% of the total publications) appeared in the top ten preferred journals respectively.

Figure 1 :Comparative analysis of top 10 subject categories by article count

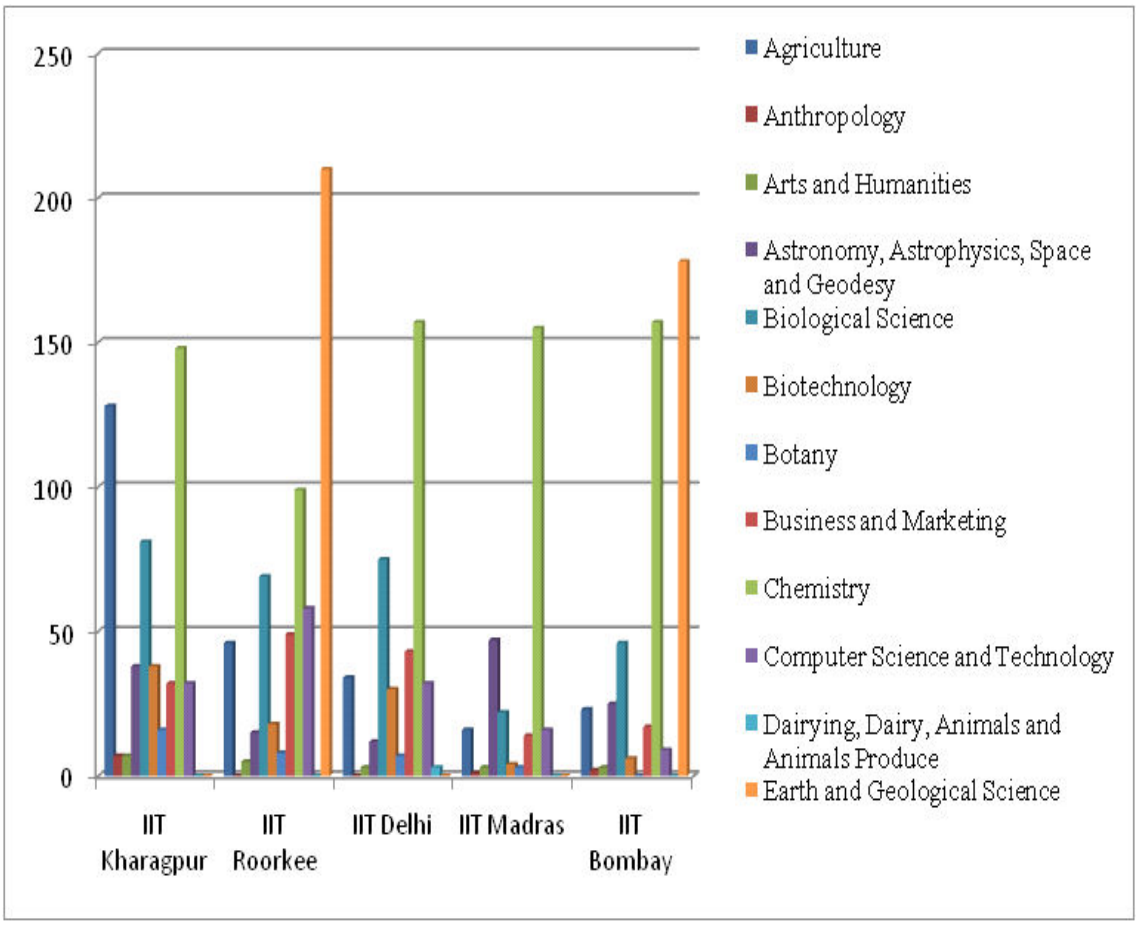

Figure 1 shows the comparison of the top ten subject categories (by article count) of the five institutions. The data analysis suggests that of the top ten subjects 8 subjects are common among the institutions. IIT Roorkee and IIT Bombay show the highest productivity Earth & Geological Science with 210 and 178 publications respectively while as for IIT Kharagpur, IIT Delhi, and IIT Madras the productivity is highest in the subject chemistry with 148, 157 and 155 publications respectively while as for IIT Roorkee and IIT Bombay the Chemistry subject is the second preference with 99 and 157 publications respectively. Arts and Humanities is the least preferred common subject category for all five institutions with single-digit publications.

Figure 2 :Comparative analysis of document type preferred for publication

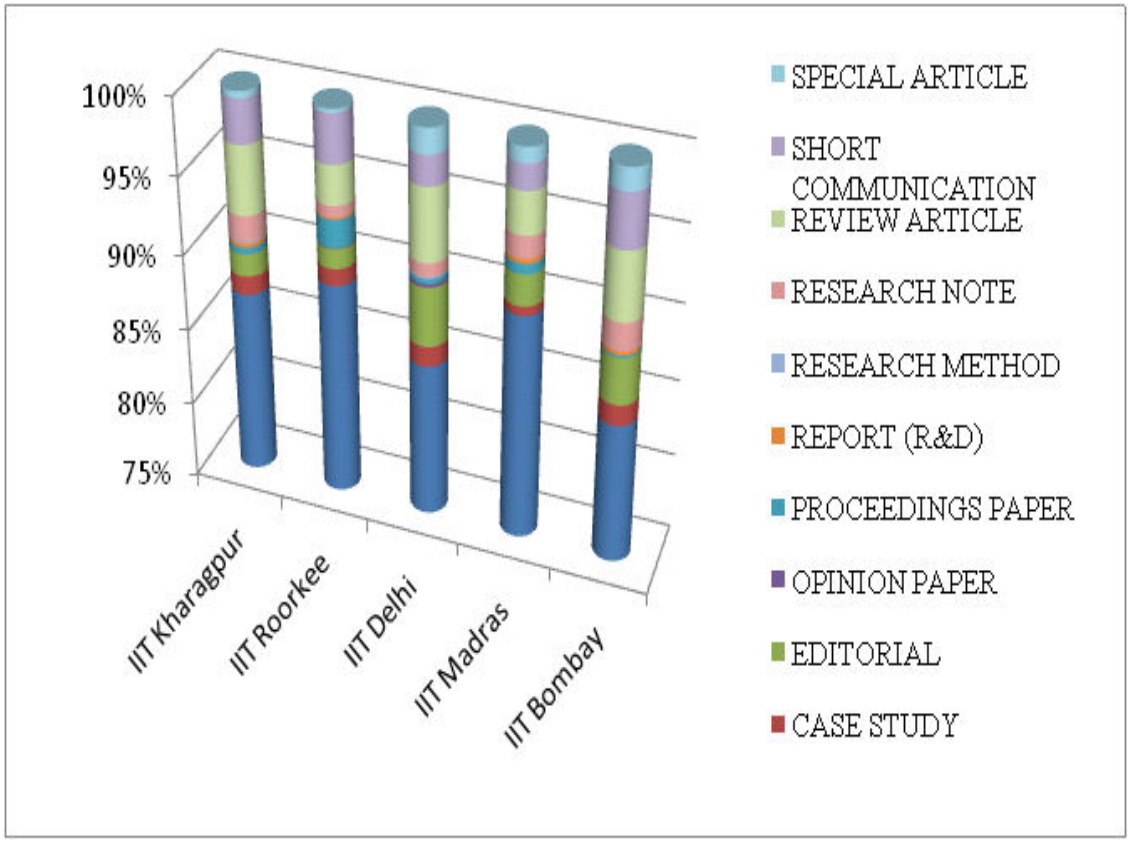

Figure 2 depicts the type of document in which the publications appear. The data shows that out of 11 document types 9 are common to all the five institutions, two types viz; opinion paper and research method are common to two institutions and report (R&D) is common to 4 institutions. The highest number of research work is published as research articles followed by review articles and short communication.

6. Conclusion :

The thorough interpretation of the harvested data suggests that the document productivity shows an uneven pattern. IIT Delhi received the highest citations though it ranks 3rd in the publication productivity. Data analysis suggests that the number of articles cited has no dependency on the total number of publications. IIT

Kharagpur and IIT Roorkee having the highest publications rank 3rd and 2nd with 25% and 24% of the total publications cited. 32% of total publications of IIT Delhi are cited and rank first. Comparison of the journal preferences shows that the institutions preferred diverse journals for publication and Current Science is the only common journal among the institutions. Chemistry is a common subject with a good amount of publications from all the institutions. This study gives a comparative outlook of the top five IITs of India but is limited to the publications indexed by the Indian Citation Index.

In the future, this study can be useful for comparative studies to find the inflow investments done by the government to such institutions and the impact of the research done. A clearer picture of the comparative study can be drawn concerning the institution's productivity by similar research work using other indexing databases like SCOPUS or Web of Science or DOAJ, JSTOR, etc. It can be concluded that India has gone a long way in research work and IIT's have contributed significantly. It can also be concluded that comparative Scientometric analysis of the institution's productivity can be helpful in the research and impact analysis and appraisal.

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Online LIS Education in the New Normal Maharashtra State

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Abstract :

The study was conducted to examine the perspectives of LIS teachers regarding their preparedness for the online education learning system in Maharashtra. It focused on the resources, platforms, assessment methods used during online LIS education. Google Meet, Zoom, online quizzes, E-PGPathashala, E-Gyankosh, Shodhaganga, Google Classroom, Whatsapp, and E-mail helped to sustain the teaching during the lockdown. The study identified few gender differences. Few suggestions from the respondents on improvements in online education are also mentioned.

Keywords :

Learning Resources, LIS Education, New Normal,Online Learning, Online Learning Tools

1. Introduction :

Information technology has made a drastic change in every field. The teaching field is no exception to this. The chalk and talk method is the most popular method, but we need to adopt new learning methods in our teaching process with this new technology. Hybrid things have different impacts; thus, if we use multiple methods, it will be helpful for a teacher to interact more with the students.

Intelligent gadgets for different tasks like teaching, designing question papers, assessment of students, feedback, and research methodology are required. Innovative teaching and learning methodologies such as short

lectures, simulation, role-playing, and problem-based learning (PBL) are very useful in addressing the rapid technological advances and developing workplaces required in the foreseeable future (Naga Subramani and Iyappan, 2018). Higher education plays an integral part in every country existence as it provides highly trained experts for future growth and prosperity (Kannadhasan et al., 2020)

2. Literature review :

Mahalakshmi and Rangaswamy (2019) presented the overview of required skills, i.e., communication, technical, and domain skills. They discussed innovativeness in teaching methods such as Problem based teaching, simulation, role-play, project-based teaching (PBT), etc., in education. Farooq and Matteson (2016) pointed out the similarities and differences between traditional and online seminars. While developing the LIS curriculum, the skills of faculty members should also be developed. The Government should also take the initiative in providing funds for creating the infrastructure in LIS schools (Edegbo, 2011). Islam andKarim (2020) conducted a literature review to investigate research studies on the use of e-resources by students in developing countries. Literature found that e-resources are a time-demand material for all education institutions. Slow internet speed reported one of the obstacles to getting their required information.

Aslam et al. (2021) believed the positive side of online learning is an excellent opportunity to enhance skills and importance in self-development. Callo andYazon (2020) studied Indian higher education during lockdown that found that lack of access to laptops or desktops was the main difficulty amongst a significant ratio of teachers and students to complete the teaching-learning task. They believed that the institution could take some measurement for the fundamental infrastructure problem. Okuonghae et al. (2021) conducted a study on technological development and self-efficacy. They depicted a substantial relationship between e-learning adoption and technological readiness, computer self-efficacy in Library and Information Science students in Nigeria. Most participants suffered from disturbances during online classes because of internet connectivity(Mohanan et al., 2020). Rafique et al., (2021) explored the significant differences in Online Learning Readiness (OLR) of students in Pakistan concerning students' readiness towards their computer, internet, and online communication self-efficacy and learning motivation depending on

the level of their program of study.

Rajkoomar and Raju (2016) have explored the educational and pedagogical issues in blended learning to develop a framework for designing and implementing blended learning in the delivery of LIS curricula in South African universities. Islam et al. (2011) explored how EL tools and technologies support the LIS education process and measure the Weights of factors constraining the use of EL in LIS education. Wójcik (2016) observed that AR technology is a helpful teaching tool that enables students to achieve improved learning outcomes in the practical skills needed by librarians and the personal and social competencies relevant to labor market needs.

3. Need and significance of the study :

Due to the COVID19 pandemic, there were restrictions on everyone in India as well as abroad. No one was prepared for this. After the declaration of lockdown in India, immediately after few days, it was directed by the officialsto begin with online education. Many were aware of technology but had not used it 100%; however, all education sectors accepted the challenge happily, and online environment education started.

It was essential to find out How LIS teaching during Online Environment is taking place? Therefore, the present study will explore the preparedness of LIS teachers for online education.

4. Objectives :

1. To study different platforms used by LIS teachers for online education.
2. To find out the type of e-resources used by the LIS teachers.
3. To explore the assessment methods used during online LIS education.
4. To study the opinion of LIS teachers about the readiness at the university level for online teaching.

5. Scope, methodology and population :

Quantitative data was collected through the questionnaire using Google forms.This study covered the 10 Universities in Maharashtra (India)having full-time Library and Information Science Courses.From the University websites and earlier research, the researcher found the number of faculty members. Simple descriptive

statistics are used to analyze the data.

6. Findings and discussion :

Table 1: University wise responses

Sl. No	Name of University	Questio-nnaire Sent	Response Received			
			Male	Female	Total	%
1	University of Mumbai, Mumbai	8	4	3	7	87.5
2	SNDT Women's University, Mumbai	5	1	4	5	100
3	Tata Institute of Social Sciences (TISS), Mumbai	4	2	-	2	50
4	Savitribai Phule Pune University (SPPU), Pune	5	1	1	2	40
5	Shivaji University, Kolhapur	6	5	-	5	83.33
6	Dr Babasaheb Ambedkar Marathwada University (BAMU)	4	1	1	2	50
7	Swami RamanandTeerth Marathwada University, Nanded SRT Marathwada University, Nagpur	3	-	1	1	33.33
8	SantGadge baba Amravati University, Amravati	3	1	1	2	66.66
9	Solapur University, Solapur	2	2	-	2	100
10	RashtrasantTukadojiMaharaj Nagpur University, Nagpur	3	1	1	2	66.66
		43	**18**	**12**	**30**	

The questionnaire was sent to 43 LIS faculty members through e-mail and Whatsapp, and total 30 responses (69.77%) received that includes 40% female teachers and 60 % male teachers. The responses received from the age group of 26-35(6.66%), 36-45(36.66%), 46-55(46.66%) and 56& above (10%). The study includes Assistant professor (40%), Associate professor (16.66 %), Head (23.33%), and visiting faculty (20%).

6.1 Teaching platforms used by LIS teachers :

Nowadays, there are various online platforms available for interaction. Comparatively, Zoom is considered easy because of its features in the main display that are easy to operate (Fuady et al., 2021).

Table 2 : University-wise response about teaching platform

Name of University (responded)	Google Meet		Zoom		Webex		Microsoft Team		Skype		TedEd / Jamboard	
	M	F	M	F	M	F	M	F	M	F	M	F
Mumbai-(4,3)	4	3	4	3	2	2	4	3	1	2	0	2
SNDT-(1,4)	1	4	1	2	0	1	0	0	0	0	0	2
TISS-(2,0)	0	0	2	0	1	0	0	0	0	0	0	0
SPPU-(1,1)	1	0	1	0	1	0	1	0	0	0	0	0
Shivaji-(5,0)	5	0	5	0	4	0	0	0	0	0	0	0
BAMU-(1,1)	1	1	0	1	0	1	1	1	1	1		1
SRT-(0,1)	0	0	0	0	0	0	0	0	0	0	0	0
Nagpur-(1,1)	1	1	1	1	1	0	0	0	0	0	0	0
Amravati-(1,1)	1	1	0	1	1	0	0	0	0	0	0	0
Solapur-(2,0)	2	0	2	0	1	0	0	0	0	0	0	0
Total	16	10	16	8	11	4	6	4	2	3	0	5
Gender-wise %	88.88	88.88	88.88	68.33	61.11	33.33	33.33	33.33	11.11	25	-	41.66
Grand Total	26		24		15		10		5		5	
Total %	86.66%		80.00		50.00		33.33		16.66		16.66	

Similarly, the present study also found that the LIS teachers used different combinations of platforms. Google Meet was the preferable teaching delivery platform (86.66% LIS teachers), followed by Zoom (80%) and Webex (50%). Skype and Tedex were the most minor preferred platforms for teaching. About 20-23% of teachers were using a combination of media such as Zoom, Google Meet, and Webex.

Table 2 depicts the University wise platform used for the teaching process. Teachers from the University of Mumbai have used all the media, followed by Babasaheb Ambedkar Marathwada University, Shivaji University, and SNDT University. Google Meet platform waseasy and effectively used by all the teachers (86.66%) except teachers from TISS who used the Zoom platform mainly and SRT University who used their developed virtual platform.

It was found that male (88.88%) and female (88.88%) teachers used Google Meet equally, whereas Zoom, Webex, Microsoft teams were used more by male teachers than female teachers.

All the LIS teachers from the age group of 26-35 preferred Google meet, zoom and Webex platforms; 72.72% of teachers from 36-45 age group preferred Google meet and Zoom, followed by Webex(54.54%); 85.71% teachersfrom 46-55 age group, preferred Google meet, followed by Zoom (78.57%),Webex (57.14%).All the teachers from the age groupof 56 and aboveused only Google Meet and Zoom platforms.

6.2 Content delivery and distribution of study material :

Naga Subramani & Iyappan (2018)mentioned that Technological Pedagogical Content Knowledge captures the qualities of these new hybrid educators who find their place between the intersections of these qualities.

Shaharanee et al. (2016) studied the effectiveness of Google Classroom's active learning activities for data mining subjects through the survey. The present study reflects that 50% of teachers of the 26-35 age group, 81.81% of 36-45, 57.14% of 46-55, and 33.33% of teachers from the 56 and above age group choose the Google Classroom platform.

Figure 1 shows that female teachers found e-mail (75%) as the best method to distribute the content, followed by WhatsApp (66.66%) and Google Classroom (58.33%), whereas male teachers preferred Google classroom, WhatsApp

(66.66%), e-mail (55.55%) and Moodle (33.33%). However, overall, WhatsApp was the preferred medium for content delivery (66.66% teachers), followed by e-mail (63.33%), Google Classroom, and Moodle (36.66% each). Digital repository is a good platform for content delivery, but only 20% of teachers chose the option. Therefore, more awareness should make about the usage of Digital repositories.

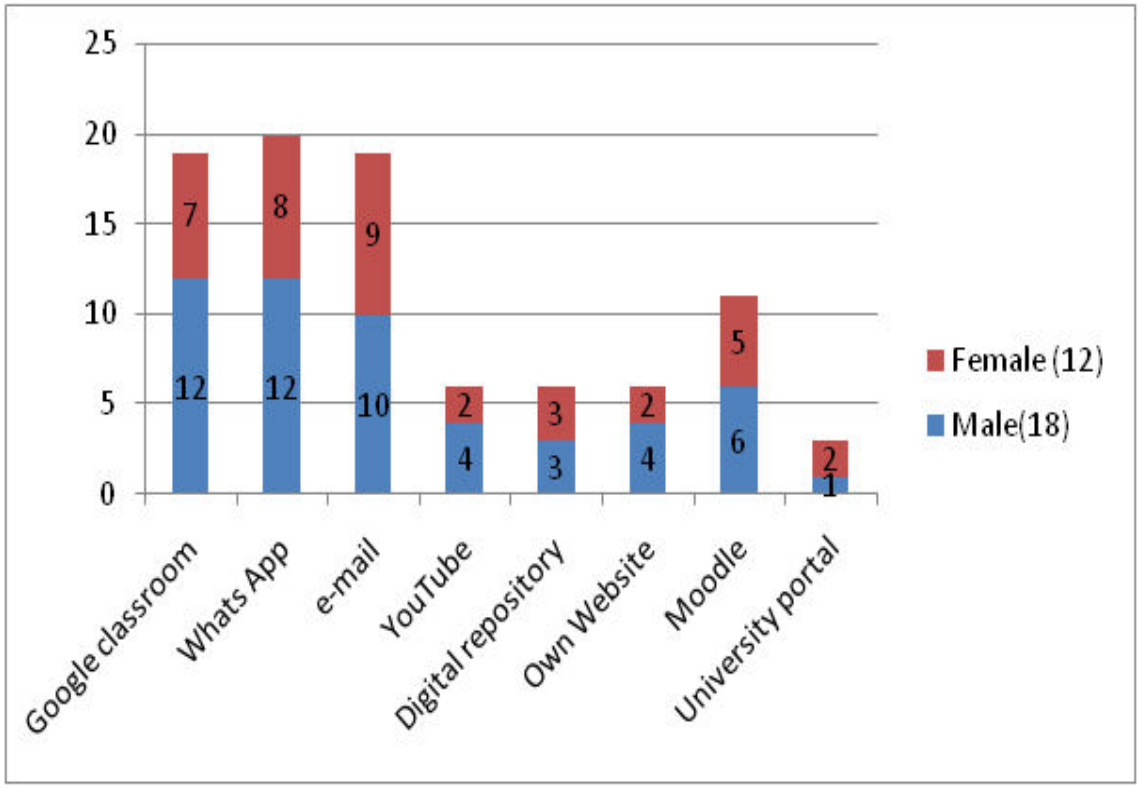

Figure 1: Distribution of material

6.3 Assessment methods :

During the lockdown, the change to the method from offline to online in all sectors started. For the education sector, conducting the examination is a big challenge. Due to the lack of high-speed internet connectivity attending lectures and submitting assignments on time would be challenging. Therefore,flexibility in submitting assignments can be provided to the students (Mahmood, 2021).

Assessments done on different platforms would encourage the students towards active participation. Teachers from the Mumbai region and Shivaji Univer-

sity, Kolhapurused multiple strategies for assessment like online quiz, short online answer, Text-based assignments, open-book test, presentations, Debate and Webinars. The online quiz was the most popular method used by teachers (77.41%), followed by the short answer (54.83%), text-based assignments & online PowerPoint presentation (48.38%), content creation and webinar (46.66%), open-book test (40%) and debate (36.66%).

LIS Teachers who were older than 35 years having more experience had used different types of assessment that wouldbe appropriate for the professional course.

6.4 University preparedness towards online education :

ICT is the most fundamental factor in providing online education. The teachers' opinions were collected using the Likert Scale (Excellent = 5, Very Good = 4, Good = 3, Ok = 2, and Poor = 1) to find University preparedness towards online education. Gender-wise differences of opinions were found on the perspectives about the role of their universities. Male teachers gave a high score for ICT, followed by communication and policy matters (refer to Table 4). In contrast, female teachers gave the highest score for proactiveness of their university, followed by ICT and communication process(refer to Table 5). According to both genders, their universities were lagging in framing the rules concerning online education.

Table 4: Male response on University preparedness

Factors	Male Respondents
ICT	71
Communication	69
Policy	65
Rules	64
Proactiveness	60

Table 5: Female response on University preparedness

Factors	Female Respondents
Proactiveness	43
ICT	38
Communication	32
Rules	31
Policy	30

6.5 Use of e-resources :

The study found that many e-resources were known to the respondents; further, they learned new resources to face the e-learning education of new normal.All the respondents knew about e-resources like e-Journals, E-PGPATHSHLA, Gyankosh, Shodhganga, Gutenberg, Free books, free journals and DOAJ.

Figure 2 represents how proficient LIS teachers make use of various e-resources. Overall, 26.66% of the teachers regularly practiced Shodhganga, 23.33% of the teachers were practicing e-journals, e-PG Pathshala, and e-GyanKosh; and 16.66% of teachers were practicing NDLI and DOAJ, and only 10% of LIS teachers were using Project Gutenberg.

About 6.67% of teachers learned about NDLI and Gutenberg during the lockdown, and about 3.33% of teachers learned about the E-PG Pathshala, Gyankosh, and DOAJ.

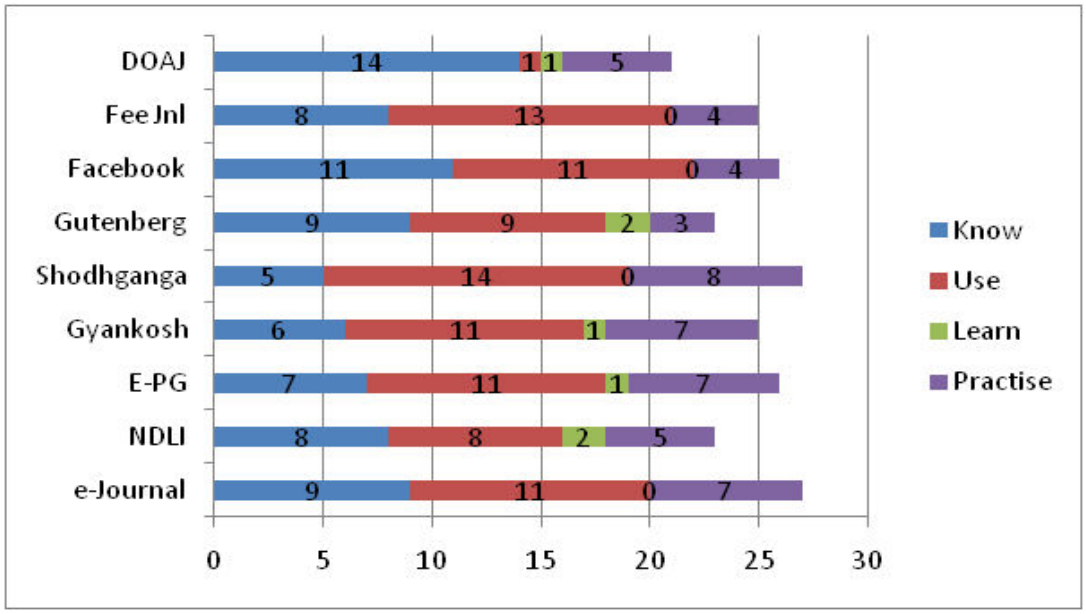

Figure 2: LIS Teachers' Knowledge E-resources

6.6 Suggestions from LIS teachers :

86.66% of the teachers expressed their views to an open-ended question about the suggestion to bring change in LIS education for the forthcoming year.

Syllabus revision

University should be flexible about syllabus completion. In addition, LIS education should enable students to prepare for online library services platforms, etiquettes, and required skills.

LIS departments

Should focus on ICT, E-Resources, ICT infrastructure, which mainly includes laptop and internet connectivity for students 24*7 access to e-resources. Universities should make availability of infrastructure regarding online teaching tools. Universities might try out innovative practices, such as loaning computers to needy students and teachers. Libraries need to develop a good collection of e-books and other e-resources in LIS.

UGC and Government initiative

UGC and Government should take the initiative towards regular training on new platforms available for online teaching and learning. Furthermore, they should be proactive to ensure the safety and security of the health of students and faculty members. Gender Studies concerning online LIS education might help to frame policies and schemes.

Students and Teachers Perspectives

Faculty should get more freedom to teach online on any available platform for online teaching. Study and teaching should be more of a fun activity yet academic for students and teachers. They need to keep updating themselves with new pedagogies themselves.

7. Conclusion :

The study comes out with a positive side that the teachers have taken the efforts to go with this online education. From various platforms of teaching, Zoom, Google Meet, Webex is the most popular combination choose by LIS teachers. Teachers knew few resources, tools, but they took an extra effort to learn a few more which will help them during their teaching process. DOAJ and Shodhgangawere two popular e-resources among the LIS teachers. MOOC, MOODLE, Google Classroom, and Google Tools used by maximum LIS teachers. Most male teachers believed that university is prepared with ICT, whereas most female teachers thought that the university is pro-activefor online education. The study comes out

with a good suggestion that the curriculum may include practical sessions for students on communication and etiquettes in online settings in LIS education. Policymakers or university authorities might use the result of the study to bring infrastructural and pedagogical changes in professional courses. Further, some studies need to be continued with students' perspectives on online LIS education. Further research in this area can frame a model for LIS online learning to bring uniformity.

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Marketing of Library Services and Evaluation of Service Utilization through Classification Method

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Abstract :

Now-a-days the role of social media is becoming more popular in academic libraries to market the resources and services among prospective patrons. The conventional method is offering various library services that have to be transformed into the application of recent technology associated with internet-based technologies. In addition, library users need and demand is also changing frequently based on the services received from the library. Hence there is a huge scope for developing an efficient method for analyzing the usage level of users based on library services. This study aimed to classify the utilization of library services by the library users and also to address the issue of multiple-view classification by integrating records that have different views. To explore consent knowledge, this research work views the variations as regularization. Performance metrics are used and evaluated the performance of the proposed classification. Results indicated that the proposed classifier outperforms the existing classifiers.

Keywords :

Classification method, Evaluation of services, Library services, LSVM, Service Marketing, Service utilization, SVM

1. Introduction :

Today, the world of the Internetis growing dynamically focusing on community-based participation in which the social media networks have been constructed and utilized. While the goals are not changed, the importance of using social media was changed where it enters to the library community.Academic libraries adopt web-based applications like DELNET,INFLIBNET and Social Networking Services which allow the library professionals to connect the users, videos, online tutorials, and to use the device for organizing educational programmes on YouTube, Facebook, and Twitter.The library make use of different types of social media like Facebook, YouTube, Twitter,WhatsApp,Telegram etc., for bringing the people into the library space and providing service where the people can be benefited to gather information both online and offline. Librarians always makeand build a silky relationship with users. Librarians perceive social media as a place for students and researchers to communicate with one another, also provide digital literacy while communicating via social media. In higher education institutions (HEC) academic libraries, to make communication with young people precisely and it is meant as a core for teaching and research. For thispurpose, libraries have to be enhanced with digitalservice to facilitate with social media for enabling collaboration and making active learning among the students, researchers and academicians.

The Present scenario focuses the social media to facilitate and give huge attention to promote library activities online. In this research, an analysis was carried out among the professional librarians in the year 2018 and it was found that only 3% of the library uses social media, the majority relies only on the traditional librarianship method and 19% of the librarians had never used social media for promoting library services.Another survey conducted among library professionals in which the result shows that only 14% of the library professionals were acquired their role in social media. In addition, 86% of libraries were using social media in which only 30% of people were uploading every day. Today majority of students are using social media and it provides access to academic library resources. This research explored social media to post the contents of library, services, size, impact of social media usage and its institutional factors. Since the universities and colleges are growing uncertain, the act of an academic library also started improved shifting as well. The repositories of the information from the academic libraries are spreading in terms of (a) institutional literary instructions (b) outreach (c) campus leadership and (d) scholarly publishing.

Hence, social media plays an essential role in empowering the libraries by connecting the stakeholder's group with academic libraries to make them engaged at all times.The social media applications are designed to enable the connectivity among the users and libraries for serving the people with the resources that they are unaware and it is valued at a high rate. Institutions like colleges and universities are also taking necessary steps to understand the usage of social media in academic libraries along with its impact outcomes. Web-based applications like blogs, social tagging,Facebook,Whatsapp,Twiter,Instagram and wikis can be employed in libraries to market their resources and its services to the current patrons. The reminders can be set to make use of library resources, utilizing the services and the event invitations, meetings, conducting competitions,feedbacks for the programs can be created by the library professionalsto promote the activities of the library in the social media. Also, the facility of using the library catalog can be provided through social-media based applications in which the students can access the library resources without visiting the library's website.

Along with, the current situation in the integration of social media in the academic library have additional barriers like, unreliable mobile or wireless services among the users, limited accessibility of resources, and difficulty in delivery of common services to different communities, fatigue in usage among staff members and may find difficulty in providing services frequently. Identification of the potential expansion area for promoting the library services with its resources and research skills can help in assisting the new generation of people who are grown up with the digital era. Despite these issues, unique contentcreation and social listening in which response, re-tweet based activities, will improve the engagement of user groups in the library and in turn the community building can be ensured.

The major objectives of marketing library services

1. To promote library activities and services through social media applications like facebook,twitter,instagram and whatsapp.
2. To use Social media applications to access digital library resources effectively.
3. To incorporate social media features with academic digital library resources.
4. To set reminders,conduct awareness programmes,creating online cataloguing system,organizing awareness sessions to market library services.

5. To use library digital catalogue system through social media applications students and faculty members should access the library resources.

2. Literature review :

Qualitative-Phenomenological architecture proposed to investigate the library policies, services, and practices. Data from four different libraries were collected and the findings show that only the homeless patrons used libraries (Louise &Chern, 2019). Machine-Learning concepts for Libraryproposed for training and teaching via use case. Comparison made with leading libraries text-based classification methods for segregating the positive and negative labels (Marta et al., 2019). Document classification procedure proposed for handling the semantic issues in library services. Methods namely, strong correlation analysis method and semantic similarity computation were used to elucidate polysemy and synonym problems (Shuo et al., 2020).Knowledge Management Technique proposed to make use of library service tools in libraries to fetch the exact information. Misclassification rate got increased while retrieving the information for users query (Maria & Kostas, 2017).

A study was conducted to analyze the most used services in regional libraries. Evaluation for examining the design strategy conducted and results utilized for presenting the analytical study, which deeply analyzes different aspects of the library services along with the involvement of different stakeholders (Lin et al., 2018). Staffing Model developed for managing the digital platforms of academic library. In this model, different hybrid framework integrated for collaborating the digital book transaction and faculty with librarian partnership modes to enhance the library services(Moonjung, Michelle & Chris, 2020). Library Collection Automationproposed to eradicate the errors that rise while user uses the library service. Classification performed using different supervised learning algorithms and results are validated for benchmarks accuracy (Kiri& Geoffrey, 2018).

GradientBoosted Decision Tree proposed to explore the trade-offs in the design space of cloud services, which could be utilized in academic libraries. Comparison was performed to measure the performance, accuracy, cost and its scalability with the experimental analysis. The result shows that the kernels of bottleneck computations yield better speed (Maxim &Venkatesh, 2018). Library Patron Assessment performed with the theoretical architecture. Findings from effective examination show the level of determining the participant's market place and their needs(Aijuan, Samuel & Jordan, 2019).Identification of pay disparities

in the libraries performed by considering the gender. For this, 44 ARL's were used for the study and findings ensured that the library service usage level increased at private libraries than public libraries. In addition, it found that the level of disparity decreases for all profession and shrinks continuously (Chen et al., 2020).

3. Research methodology :

This research study investigates the utilization of most common library services in the libraries to assist the users in information seeking. Libraries are helping in making a difference to the users by providing various kinds of services as and when the need arises through appropriate services. Investigating and analyzing all the library-services will make the research tedious and objective of the research cannot be reached. This research data was collected from 960 library users of 28 libraries in and around Coimbatore district using structured questionnaire.

Some of the most common library services provided by the libraries listed are:book lending services, current awareness services,digital library services,interlibrary loan services,newspaper clipping services,online reservation of books,library orientation services,photocopying services,reference services and Wi-Fi services.

4. Performance metrics :

This research work makes use of below mentioned metrics to analyze the performance of proposed classifier against SVM (Tong et al., 2018) and MALIS (Chauhan, Dahiya& Sharma, 2019). In the evaluation stage of the proposed classifier that has been built, it is looking for the value of predicting testing features and testing labels of the model built, then utilizing the predicted value obtained to obtain the Confusion Matrix of the model. The classifier must be produced the trust value of the prediction results. The classifier makes correct predictions even though it is roughly interpreted as a probability. However, the possibility of getting the correct prediction is not enough to only give one number.

Indicates the count of records. (true positives) denotes the records that are correctly that falls under the library services category. (true negative) denotes the records that falls not under the library services category. (false positive) is the number of records that are incorrectly predicted about library services. (false negative) is the number of records that are incorrectly predicted as not as library services.

5. Results and discussion :

This section discusses the outcomes of experimental analysis carried out in MATLAB. Figure 1 to Figure 4 shows the performance of the proposed method through the different performance metrics.

5.1 Variables analysis :

In Figure 1, the variables TP, TN, FP and FN are plotted in x-axis and count of records are plotted in y-axis. The positive and negative samples are used for forming the hyper plane to segregate the positive and negative classes in which the margin between both of these classes is maximized. Maximizing of these margins help to solve the problem of optimization through which the normal vector can be formulated.Based upon the correct and incorrect prediction, the variable analysis is calculated. From the graph, it is clear to understand that the proposed classifier LSVM predicts more true cases and less false cases than SVM and MALIS, which provides a way for getting the enhanced result in accuracy. This helps the library professionals in determining the most common library services through optimization technique and put more efforts in enhancing a particular library service to the users.

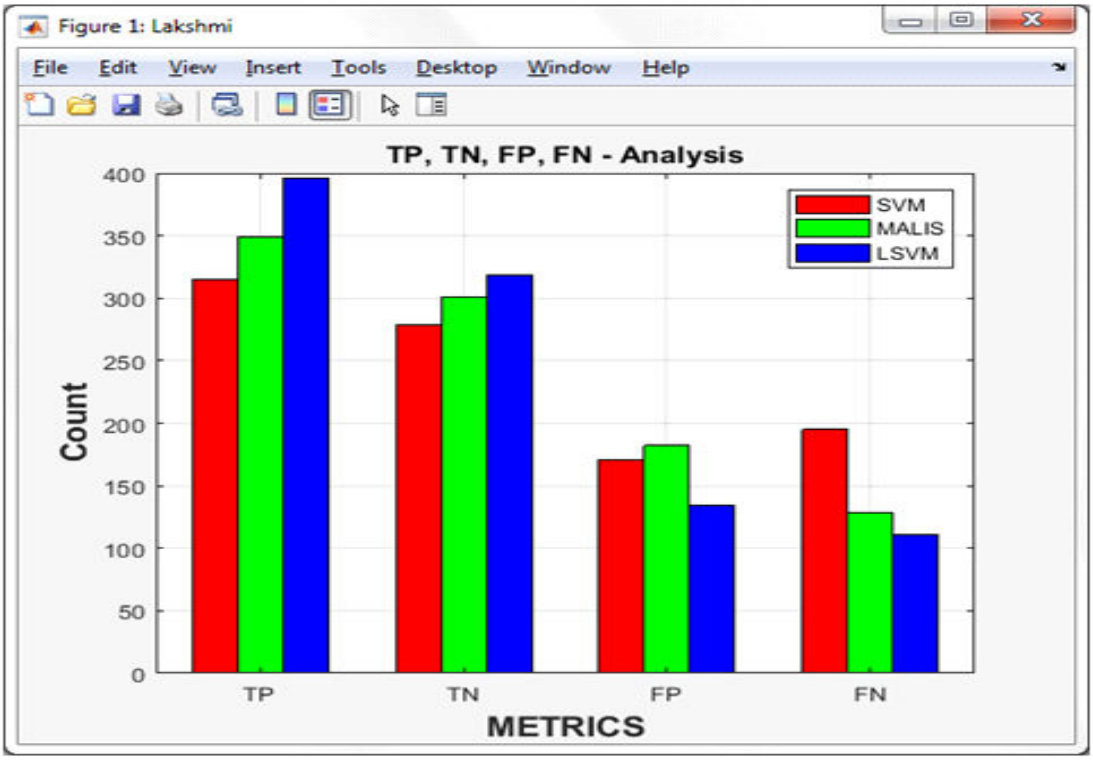

Figure 1 Variable Analysis

5.2 Sensitivity and specificity anlysis :

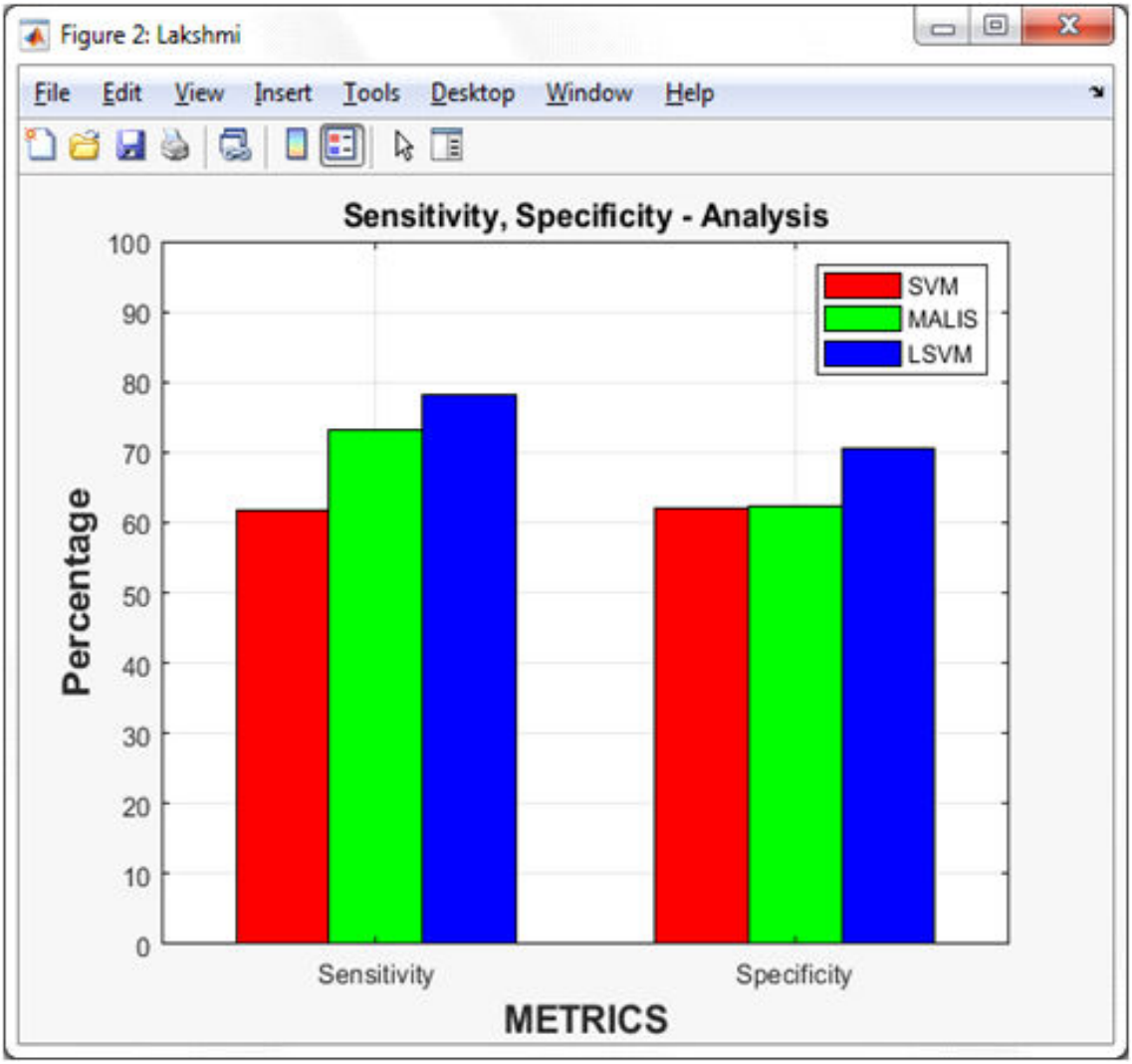

Figure 2 Sensitivity and specificity analysis :

Figure 2 indicates that the proposed technique LSVM achieves high sensitivity and specificity rate which is better than other existing classifiers namely SVM and MALIS methods. The performance of different classifiers were portrayed with good balance among sensitivity and specificity where the evaluation is carried out with the help of hard and soft margins for classifying the different categories of library services accurately. LSVM quantifies the proportion of true positive rate and true

negative rate respectively, which proves to be the promising technique for classifying the library services according to level of usage library users.

5.3 Precision and recall analysis :

Figure 3 represents the percentage of precision and recall obtained for proposed classifier against SVM and MALIS. Classifier that achieves the highest recall is said to be the most efficient and it is derived based on the number of false positive and false negative values. Therefore, the classifier with low false negative value is proved to be better than other. If the two different classifier yields equal value, then highest precision should be chosen. The precision will increase when there is decrease in false negative. From the graph it is clear to understand that LSVM technique is classifying in a unique manner in which the total amount of relevant classes were identified correctly.

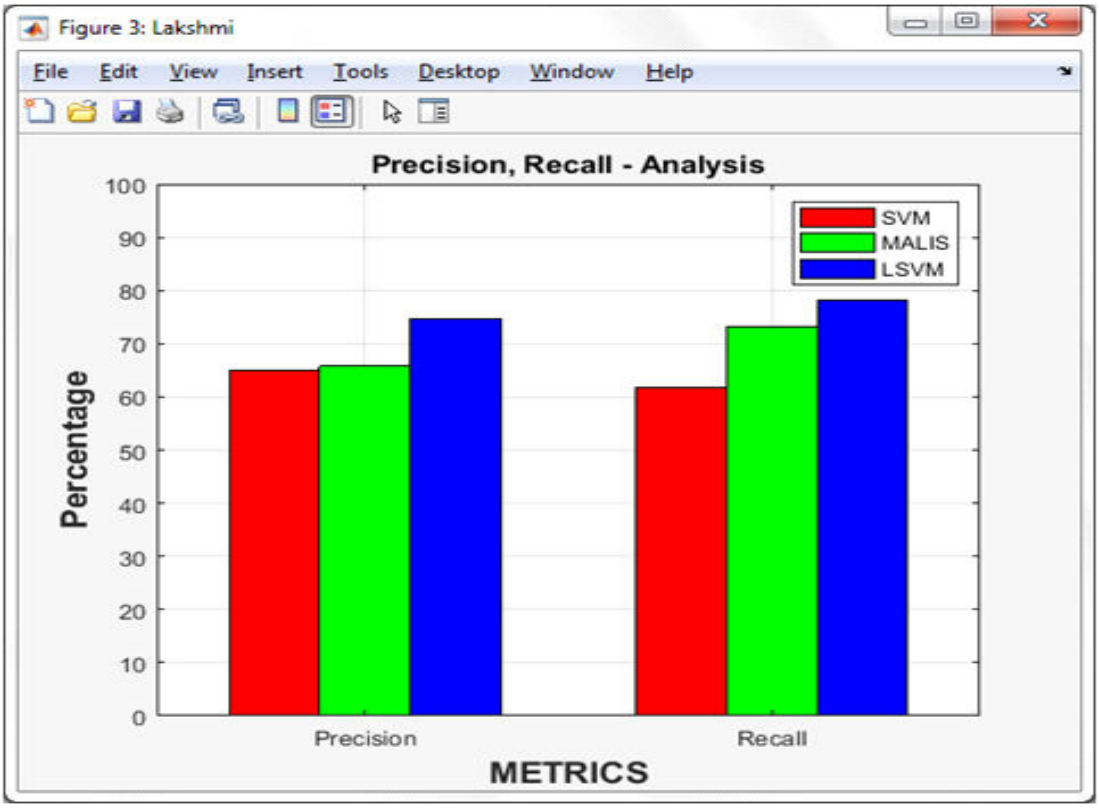

Figure 3 Precision and recall analysis :

5.4 Accuracy and f-measure analysis :

Figure 4 demonstrate the result of accuracy and f-measure metrics obtained for LSVM against SVM and MALIS. The slack variables of the formulated proposed technique were transformed into equalities with the performance evaluation and the solution for optimality is evolved. Since, the hyperplane of the classifier corresponds to non zero multipliers, they are constrained with active and binding conditions where the unique optimal solutions were found. Therefore, the dual variables in the objective function holds less amount of primal variables at which the efficiency of the proposed method is increased and the accuracy of LSVM is found to be better in prediction of classes accurately as the hyperplane lies at the centre of the axes. Also, it is able to predict the positive and negative classes accurately when compared with other classifiers SVM and MALIS which is clearly portrayed.

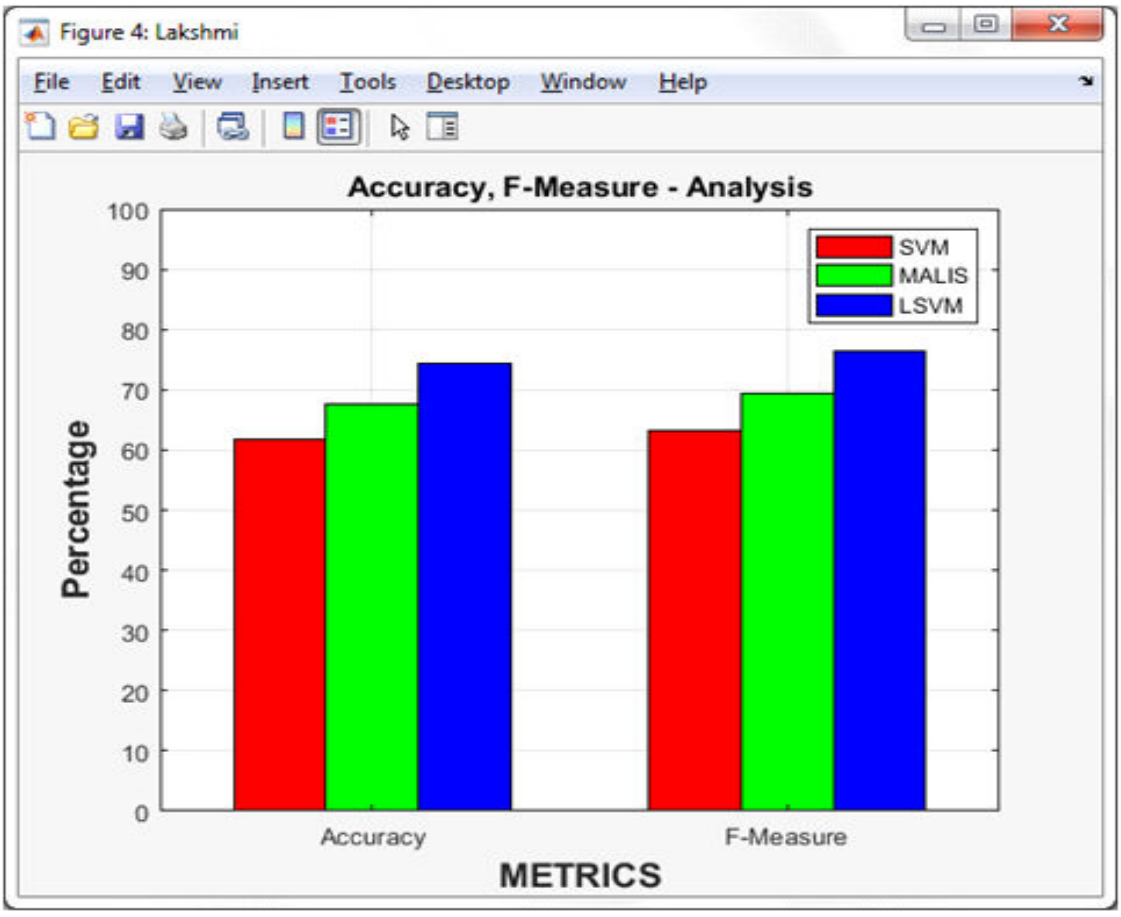

Figure 4 Accuracy and F-Measure Analysis

5.5 Classification of library user utilization of services :

When making an analysis about the classification of services, it is evident that the MALIS and SVM are providing more false positives and false negatives than LSVM. Also, it is clear to make an understanding that library users in Coimbatore prefer digital library services than other services. While enhancing the digital library services there exists more chances to increase the utilization of library resources.

Table 1. Service Classification

Services	MALIS	SVM	LSVM
Book Lending Services (S1)	30	79	95
Current Awareness Services (S2)	22	108	303
Digital Library Services (S3)	9	95	349
Interlibrary Loan Services (S4)	145	97	25
Newspaper Clipping Services (S5)	145	98	20
Online Reservation of Books (S6)	21	104	19
Library Orientation Services (S7)	148	87	21
Photocopying Services (S8)	149	102	18
Reference Services (S9)	281	100	20
Wi-Fi Services (S10)	10	90	90

6. Limitations of the study :

The study is limited to Coimbatore district and selected libraries and also 10 library services for this proposed research study. This study focuses only the users of social media and web applications.

7. Conclusion :

Supervised learning algorithm namely Liable Support Vector Machine (LSVM) proposed to analyze and classify the content of library-user interactions on social media for improving their utilization of library resources and services. LSVM works better at high dimensional space which can able to transform the data based on their optimal boundary within the defined outputs and therefore it is applied for classifying the users, based on their interactions with the social media for accessing their library oriented services. Experimental results were validated with the real world datasets which proves that proposed classifier LSVM is superior to all other methods in classifying the classes accurately that leads to increased performance in terms of accuracy which in terms of library services clearly indicates that users are looking for more of electronic library services than other services through this classification method. It also implies that the more margin is set more optimal services can be provided to the academic library users and also increase the library utilization which is the utmost objective of every librarian in today's world.

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Content Analysis of Library Websites of State Aided Universities in Kolkata City, West Bengal : an evaluative study

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Abstract :

The present study is conducted with web based content analysis of university library websites of state aided universities located at Kolkata city in West Bengal during October to December, 2020. The library websites of studied universities were identified from Google, Wikipedia and other E-Resources. Only university library, CU and Central Library, MAKAUT have separate library homepage which are direct accessed by the library users. Remaining other seven studied university library websites are accessed through their university websites. JU furnished the greatest number of items in library websites obtained 21 points which is the highest rank among the nine universities at Kolkata in West Bengal, followed by AU with 19 points as 2nd highest rank and CU with 17 points as 3rd highest rank.

Keywords :

Content Analysis, State Aided Universities, University Library, University Library Websites

1. Introduction :

A website is an emerging technology which plays a vital role in the educational institution. Website is a collection of data which consists of Web pages, Audio, Video, images, documents. The sites are used by educators for both professional development and as a teaching and learning tool and usually restricted to general public. Website is one of the significant tools to public the activities of the institution (Mani, Thirumagal & Vinodh, 2017).

Library website has become a Sine-Qua-non for any academic institution either

college or university setup to integrate its resources and services under one umbrella known as Library Website and as such special care has to be taken in designing and developing functionable website from the perspective of user needs. In fact, the accreditation agencies like National Assessment and Accreditation Council (NAAC) advocates for Library website (Jange, 2014).

The principal aim of this paper is to lead the Library & Information Science Professionals in improving their existing university library websites.

2. Previous studies :

A web-based survey was conducted to locate and evaluate the content of library websites in India like Kumar and Singh Mir (2017) studied on Central Region in India. Singh and Gautam (2016) conducted a survey in Delhi city. Verma and Devi (2015) carried out the study in North Eastern States. Prakash (2013) evaluated in India. Shukla and Tripathi (2010) made in India.

Few studies were conducted on content analysis of Deemed Universities in India such as Savitha (2016) analyzed in Karnataka. Krishnakumar (2014) studied in Tamil Nadu. Vasishta (2013) evaluated in North India and Jange (2014) studied in Karnataka.

Similar studies of the state aided university library websites in eastern India were not carried. Therefore, this type of effort will be helpful to evolve significant university library websites in eastern region particularly in West Bengal.

3. Objectives :

Main objectives of this study are:

- To investigate the basic information available in these university library websites
- To know the library collection, library services and links to other resources available in the university libraries
- To identify the type of content and basic features made available on library websites
- To establish criteria for content analysis for evaluating university library websites

- To rank the selected university library websites based on the identified criteria

4. Materials and Methods :

A web-based survey was conducted to locate and evaluate the content of library websites of State-aided Universities located at Kolkata city in West Bengal during October to December, 2020. During this process eleven State-aided university websites or webpage were appeared under this investigation. But two Sate-aided Universities i.e. WBUHS and WBUTTEPA, did not have library webpage which were not selected for the study. Hence the study covered nine (9) State-aided University library websites located at Kolkata city. Content information was collected through searching, browsing and analyzing the selected university library websites. The library websites of studied universities were identified from Google, Wikipedia and other E-Resources. Further, the collected data was tabulated and analyzed for the purpose of interpretation and discussion.

5. Results and Discussion :

Total nine state-aided university library websites located at Kolkata city in West Bengal are analyzed for the study purpose.

5.1. State aided universities at Kolkata City in West Bengal :

Table 1 reveals the list of eleven state aided universities with status, year of establishment and website address.

Table 1: List of state aided universities

Sl. No.	Unuversity Located at Kalkata	Abbreviation	Type	Established	URL
1	Aliah University	AU	State Aided	2008	www.aliah.ac.in
2	Calcutta University	CU	State Aided	1857	www.caluniv.ac.in
3	Jadavpur University	JU	State Aided Autonomous	1955	www.jaduniv.edu.in

4	Maulana Abul Kalam Azad University of Technology	MAKAUT	State Aided	2000	www.makautwb.ac.in www.wbut.ac.in
5	Netaji Subhas Open University	NSOU	State aided & Distance Education	1997	www.wbnsou.ac.in
6	Rabindra Bharati University	RBU	State Aided	1962	www.rbu.ac.in
7	Presidency University	PU	State Aided	2010(College in 1817)	www.presiuniv.ac.in
8	Sanskrit College & University	SCU	State Aided	2015(College in 1824)	www.sansuniv.ac.in
9	West Bengal University of Animal & Fishery Sciences	WBUAFS	State Aided	1995	www.wbuafscl.ac.in www.wbuafsce.org
10	West Bengal University of Health Sciences	WBUHS	State Aided	2003	www.wbuhs.ac.in
11	West Bengal University of Teachers' Training, Education Planning & Administration	WBUTTEPA	State Aided	2015	www.wbuttepa.ac.in

Jadavpur University (JU) is a state aided autonomous University, Netaji Subhas Open University (NSOU) is a state aided and distance mode university, and other remaining nine universities are state aided universities under Government of West Bengal at Kolkata city.

5.2 Library website profile of state aided universities :

Table 2 shows the library website profile of state aided universities.

Table 2 : Library website profile

Sl. No.	Name of the University and Library	Library Webpage	Content-Structured / Linear Text
1.	Alia University Library, A U www.aliah.ac.in/department/central-library	Yes	Linear
2	University Library, C U www.culibrary.ac.in	Yes	Structured
3	Centre for Digital Library & Documentation, J U www.jaduniv.edu.in/122.15.82.40:990	Yes	Linear
4	Central Library, MAKAUT http:// library.wbut.ac.in	Yes	Structured
5	NSOU Library, NSOU www.wbnsou.ac.in/library_sevices	Yes	Linear
6	University Library, RBU www.rbu.ac.in/universitylibrary	Yes	Linear
7	Presidency University Library, PU www.presiuniv.ac.in/web/lbrary/	Yes	Linear
8	Library, SCU www.sansuniv.ac.in/p/library	Yes	Linear
9	Central Library, WBUAFS www.wbuafscl..ac.in/central-library/	Yes	Linear
10	WBUHS	No	Not Available
11	Library, WBUTTEPA	No	Not Available

Only university library, CU and Central Library, MAKAUT have separate library homepage which are direct accessed by the library users. The content of only two university libraries of CU and MAKAUT is structured. Remaining other seven

studied university library websites are accessed through their university websites which are linear type.

5.3 Basic information of the sate aided university libraries :

Table 3 reveals the basic information of the state sided university libraries at Kolkata city.

Table 3 : Basic information

Sl. No.	Content on Basic Information	AU	CU	JU	MAKAUT	NSOU	RBU	PU	SCU	WBUAFS	Total (out of 9)
1	Contact Us	Y	-	Y	-	Y	Y	Y	Y	-	6
2	FAQ's	-	-	Y	-	-	-	-	-	-	1
3	Library Hours	Y	Y	-	Y	Y	Y	Y	-	Y	7
4	Library Profile	Y	Y	Y	Y	Y	-	-	-	Y	6
5	Library Rules	Y	Y	Y	Y	-	Y	Y	-	-	6
6	Library Staff	Y	-	-	-	-	-	Y	-	-	2
7	Membership	-	-	Y	Y	-	Y	-	-	-	3
8	Photo Gallery	-	Y	-	Y	Y	-	-	Y	Y	5
9	Publications	-	-	Y	-	-	-	-	-	-	1
10	Services	Y	-	Y	-	Y	-	-	-	Y	4
	Total Score(Max.10)	6	4	7	5	4	4	4	2	4	-
	Percentage (%)	60	40	70	50	40	40	40	20	40	-

While JU library website provided majority 70 % of the basic information, whereas, AU library website provided 60 % of the basic information and followed by MAKAUT University library website with 50 %.

5.4 Library collection :

Table 4 displays the library collection of university library websites of state aided universities.

Table 4: Library collection

Sl. No.	Website Content on Collection	AU	CU	JU	MAKAUT	NSOU	RBU	PU	SCU	WBUAFS	Total (out of 9)
1	Book Bank	-	-	-	-	-	-	-	-	Y	1
2	Digital Collection	-	Y	-	-	-	-	Y	-	-	2
3	Library Collection	Y	-	Y	-	-	Y	-	-	-	3
4	New Arrivals	Y	Y	-	-	-	-	-	-	-	2
5	Question papers	-	-	Y	-	-	-	-	-	-	1
	Total Score (Max. 5)	2	2	2	0	0	1	1	0	1	-
	Percentage (%)	40	40	40	0	0	20	20	0	20	-

Three university libraries provided the information about library collection and two university libraries provided information about digital collection and new arrivals on their websites. AU, CU and JU university library have provided 40% information and followed by NSOU, PU and WBUAFS university library with 20% information availability on different types of library collections.

5.5 Electronic resources :

Table 5 shows electronic resources in library websites of state aided universities.

Table 5: Electronic resources

Sl. No.	Website Content on Electronic Resources	AU	CU	JU	MAKAUT	NSOU	RBU	PU	SCU	WBUAFS	Total (out of 9)
1	Digital Archive	Y	Y	Y	-	-	-	Y	-	-	4
2	E-Books	Y	Y	Y	Y	Y	Y	Y	-	Y	8
3	E-databases	-	Y	Y	-	-	-	-	-	-	2
4	E-Journals	Y	Y	Y	Y	Y	Y	Y		Y	8
5	E-Theses	-	Y	Y	-	-	-	Y	-	Y	4
6	E-resources at a Glance	Y	Y	-	Y	-	-	-	-	-	3
7	Institutional Repository	-	Y	Y	Y	-	-	-	-	-	3
8	Links to other Websites	Y	Y	Y	Y	-	-	-	-	-	4
	Total Score (Max. 8)	5	8	7	5	2	2	4	0	3	-
	Percentage (%)	62.5	100	87.5	62.5	25	25	50	0	37.5	-

CU university library website provided 100% information on electronic resources, followed by JU university library with 87.5% information, AU, MAKAUT university library with 62.5% information each and PU library with 50% information on their websites.

5.6 Library services :

Table 6 provides information about the availability of library services.

Table 6: Library services

Sl. No.	Website Content on Library Services	AU	CU	JU	MAKAUT	NSOU	RBU	PU	SCU	WBUAFS	Total (out of 9)
1	ILL	Y	-	-	-	-	-	-	-	Y	2
2	Lending Services	Y	Y	Y	Y	Y	-	-	-	Y	4
3	Reference Services	Y	-	-	-	-	-	-	-	Y	2
4	Research Assistance	Y	-	Y	-	-	-	Y	-	-	3
5	Reprography Services	-	-	-	-	-	-	-	-	Y	1
	Total score (Max. 5)	4	1	2	1	1	0	1	0	4	-
	Percentage (%)	80	20	40	20	20	0	20	0	80	-

Both AU and WBUAFS university library provided 80 % information on library services, followed by JU university library with 40 % information and CU, MAKAUT, NSOU and PU university library with 20% information on their website.

5.7 Features of university library websites

Table 7 reveals the features of university library websites of state aided universities at Kolkata city.

Table 7: Features of university library websites

Sl. No.	Website Content on Features of Library websites	AU	CU	JU	MAKAUT	NSOU	RBU	PU	SCU	WBUAFS	Total (out of 9)
1	Ask a Librarian	-	-	-	-	-	-	-	-	-	0
2	Direct Link	-	Y	-	Y	-	-	-	-	-	2
3	Download Forms	Y	Y	Y	Y	-	-	Y	-	Y	6

4	Registration/Login	-	-	-	Y	-	-	-	-	-	1
5	Single Widow Search	-	-	Y	-	-	-	Y	-	-	2
	Total Score (Max. 5)	1	2	2	3	0	0	2	0	1	-
	Percentage (%)	20	40	40	60	00	00	40	00	20	-

MAKAUT university library provided 60 % information on features of library websites, followed by CU, JU, RBU with 40 % information and AU, WBUAFS with 20 % information on features of library websites.

5.8 Comparative checklist of university library websites

Table 8 shows comparative study of nine university library websites.

Table 8: Comparative checklist

University Library Websites	Basic Information	Library Collection	E-Resources	Library Services	Features	Total score out of 33
AU	6	2	5	5	1	19
CU	4	2	8	1	2	17
JU	7	2	7	3	2	21
MAKAUT	5	0	4	1	3	13
NSOU	4	0	2	1	0	7
RBU	4	1	2	0	0	7
PU	4	1	4	2	2	13
SCU	2	0	0	0	0	2
WBUAFS	4	1	3	5	1	14
Total	40	9	35	18	11	

From the above table it is found that JU furnished the greatest number of items in library websites obtained 21 points which is the highest points among the nine universities at Kolkata in West Bengal, followed by AU with 19 points as 2nd highest and CU with 17 points as 3rd highest.

5.9 Five point ranking scale

Table 9 : Five-point range scale

Range of Points	Results
01-07	Need to Improvement
08-14	Below Average
15-21	Good/Average
22-28	Very Good/Above Average
29-35	Excellent

5.10 Ranking of university library websites

Table 10 shows the ranking of studied university library websites.

Table 10 : Ranking of university library websites

University Library Websites	Total Score out of 33	Rank	Rating Scale	Remarks
Jadapur University (JU) Library	21	1	15-21	Average
Aliah University (AU) Library	19	2	15-21	Average
Calcutta University (CU) Library	17	3	15-21	Average
WBUAFS Library	14	4	08-14	Below Avarage
MAKAUT Library	13	5	08-14	Below Average
Presidency University (PU) Library	13	5	08-14	Below Average
NSOU Library	7	6	01-07	Need to Improvement
Rabidra Bharati University (RBU) Library	7	6	01-07	Need to Improvement
Sanskrit College & University (SCU) Library	2	7	01-07	Need to Improvement
Total	113	-		

JU library got highest total score of 21 out of 33 points ranked with 'Average', followed by AU library with 19 points ranked with 'Average', and CU Library with 17 points ranked with 'Average'. The university library websites of three universities NSOU, RBU and SCU are ranked with 'Need Improvement'.

6. Findings :

Major findings are as follows :

- Only university library, CU and Central Library, MAKAUT have separate library homepage which are direct accessed by the library users. Remaining other seven studied university library websites are accessed through their university websites.
- Two States-aided Universities WBUHS established in 2003 and WBUTTEPA in 2015, did not have library webpage/homepage.
- While JU library website provided majority 70 % of the basic information, whereas, AU library website provided 60 % of the basic information.
- JU furnished the greatest number of items in library websites obtained 21 points (out of 33) which is the highest rank among the nine universities at Kolkata in West Bengal, followed by AU with 19 points as 2nd highest rank and CU with 17 points as 3rd highest rank.

7. Conclusion :

From the above work it is evident that library websites of nine studied universities are not matching each other. But as per requirement of library users coming from our same society, it is required to design a uniform structured and standard recorded information type of university library websites located at Kolkata city in West Bengal during the study period for providing maximum library materials and library services to their library users and also furnished connect to other university libraries in India. It is necessary to supply update, accurate and correct information to thier library users in time as per their need.

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A Study on the Role of Indian Library Associations in the Scholarly Communication through Websites

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Abstract :

The main focus of this paper is to study the contribution and influence of library associations' scholarly communication through their respective websites. Scholarly publication plays a significant role in promotion, scholarly recognition, development, certification at different associations as well as institutions. This study presents how the library associations' publications give support to scholarly communication. The study analyses the websites of the associations thoroughly to reveal the role of the publications to enrich scholarly communication in the field of Library and Information Science. It also gives stress to having own and well-maintained websites incorporating open access full-text scholarly resources for enriching scholarly communication. Thus this study has created a value addition in the role of library associations.

Keywords :

Library Associations, LIS Professionals, Publications, Scholarly Communication, Webinars, Websites

1. Introduction :

Library professionals felt the urge to be united to accomplish their goals. As a result, India got her first library association in 1914 officially in the name of Andhra Desa Library Association. The library associations are mainly formed to improve library services, to expand professional knowledge, to provide leadership quality among the library professionals, to promote fellow feeling, to safeguard their rights, to organise educational programmes and many others. To initiate the scholarly study, the library associations started printing and publishing books and journals also. In this way, they have tried to improve Library and Information Science (LIS)

profession and professionals as well. So, gradually library associations started to play a vital role in scholarly communication for enriching the philosophy of LIS. To share one's findings with others, the process which started to gain popularity is called scholarly communication. This term emerged from the publication of the first journal in 1665 and became popular in the 1970s. (Das, Anup Kumar, 2015). Thus library associations through their various publications started participating in scholarly communication in the post-independence period. With the passage of time when websites have already become famous for their usefulness and the open access movement is gaining momentum, the library associations are improving their websites incorporating scholarly resources to augment the function of library associations in scholarly communication.

2. Review of related literature :

Many studies are done for assessing the developing attitude of the library associations in India and how they are gradually playing various academic as well as professional roles through their respective websites. Biswas and Das Biswas (2014) had re-evaluated the function of library associations in the pre-independence and post-independence eras. Ghosh (2004) had revealed an emerging role of the library associations in Indian library development in an ever-changing information scenario. Karisiddappa (2002) discussed the role and importance of state and national level associations in library development in India. Pradhan had revealed the objectives and function of the Indian Library Association (ILA) and the Indian Association of Special Libraries and Information Science (IASLIC) in 2018. Satpathi and Ghosh (2012) had depicted the role of IASLIC in developing computer skills among LIS professionals in India. Eventually, library associations started to show their impact on Library and Information Science education. This is presented by Basu and Dutta (2017). Similar research was done by Vinayagamoorthy and Kumari in 2015 when they discussed the importance of library associations to promote education, research and training. Now the library associations are developing their websites for communication. In 2015 Chandra presented the role and impact over the web of the library associations. Another research to analyse the contents and interactivity of the national websites around the world was done by Haneefa and Jiji in 2019. Library associations have been participating in scholarly communications through their various publications from the beginning but the overall picture of scholarly communica-

tion has been changed for the use of WWW. Mukherjee had beautifully shown the journey of scholarly communication from print to the web in 2009. The perspective of the study can be understood from the related literature review.

3. Need of the study :

Many kinds of research have been done to explore the function of Indian library associations and their pivotal role in LIS education. Studies have also been done to establish the relationship between publications and scholarly communication. Some papers are presented to show the impact of the web on the communication process of library associations. But this study is extremely concerned to reviews the role of Indian library associations' publications in scholarly communication through their respective websites.

4. Objectives :

The objectives of the study are as follows

1. To identify the role of Indian library associations in scholarly communication
2. To find out the impact of associations' websites in scholarly communication
3. To examine how much library association are effective in scholarly communication by incorporating scholarly resources in the websites.

5. Methodology :

The related literature of different interpretations of LIS professionals was studied in detail for this study. Several useful links were surveyed for the same from November, 2020 to March, 2021. And finally, 27 Indian library associations' websites were found socially active whose web contents have been analysed to find out the role of library associations in scholarly communication.

6. Analysis of data :

There are many state and national level library associations in India. Only the library associations having their websites are listed below with their acronym, year of establishment, place and domain name.

Table 1:State level library associations

Sl. No.	State Level Associations	Acro-nym	Year	Place	Domain
1	Andhra Pradesh library Association	APLA	1914	Andhra pradesh	apla.co.in
2	Bengal Library Association	BLA	1925	West Bengal	blacal.org
3	Madras Library Association	MALA	1928	Madras	madraslibraryassociation.com
4	Karnataka State Library Association	KALA	1929	Karnataka	kalaonline.com
5	Punjab Library Association	PLA	1929	Punjab	punjabla.org
6	Assam Library Association	ALA	1938	Assam	ala.net.in
7	Kerala Library Association	KLA	1945	Kerala	keralalibraryassociation.org
8	Delhi Library Association	DLA	1953	Delhi	dlaindia.in
9	Gujrat Library Association	GLA	1953	Gujrat	glavvn.wordpress.com
10	Madhya Pradesh Library Association	MPLA	1957	Madhya Pradesh	mpla.org
11	Haryana Library Association	HLA	1966	Haryana	haryanalibraryassociation.in
12	Assam College Librarians Association	ACLA	1973	Assam	acla.co.in
13	Bombay Science Librarians Association	BOSLA	1975	Mumbai	bosla2013.wixsite.com
14	Himachal Pradesh Library Association	HPLAS	2006	Himachal Pradesh	hplas.org
15	Jharkhand Information and Library Association	JILA	2007	Jharkhand	jila.org.in
16	Academic Library Association of Goa	ALAG		Goa	alaggoa.weebly.com
17	West Bengal College Librarians Association	WBCLA	1979-80	West Bengal	wbcla.org.in
18	Maharashtra University and College Librarians Association	MUCLA	2013	Jalgoan	mucla.in
19	Rajasthan Technical Library Association	RTLA	2010	Rajasthan	rtlaindia.org

Table 1 presents the list of 19 state level associations which have contributed a lot in scholarly publications through their websites.

Table 2 : National level library associations

Sl. no.	National Level Associations	Acronym	Year	Place	Domain
1	Indian Library Association	ILA	1933	New Delhi	ilaindia.net
2	Indian Association of Special Libraries and Information Centres	IASLIC	1955	West Bengal	iaslic1955.org.in
3	Indian Association of Teachers of Library and Information Science	IATLIS	1969		iatlis.org
4	Association of Agricultural Librarians Documentalist of India	AALDI	1971		aaldi.in
5	Society for Information Science	SIS	1976		sis.org.in
6	Society for Advancement of Library and Information Science	SALIS	2002	TamilNadu	salis.in
7	Central Government Library Association	CGLA	2004	Uttarakhand	cgla.org.in
8	Indian School Library Association	ISLA	2018	Delhi	isla.org.in

Table 2 presents the list of 8 National level associations which have their official websites for participating in scholarly communications through various publications.

Publication

The publications which are available through websites only are provided

Table 3 : Newsletter

Sl. NO	**Association** (Fr, Accessibility : Off / On / Off & On)	Content
1.	**MPLA** (Q, On)	About association, consortium, webinars and certificate programmes and miscellaneous
2.	**PLA** (Q, Off & On)	Archive of newsletter not functioning and miscellaneous.

3.	**MALA** (Q, On)	About association, jobs, events, articles on library and information science and allied areas, library management and miscellaneous
4.	**KLA** (Q, On)	About association, lectures by renowned person, message from senior LIS professionals, programmes related to development of library and miscellaneous.
5.	**GLA** (Q, Off & On)	About association,conference/seminars /symposium in library and information science, useful information about LIS profession and technology, news on the upcoming eventsand miscellaneous.
6.	**BOSLA** (Bi-an, On)	About association, annual lecture series on LIS and allied areas, past and upcoming events, report on various work-shop, achievements, open source initiatives, various library orientation program, digital library project, about latest de-velopment and miscellaneous.
7.	**WBCLA** (Q, On)	About association, activities and achievements and mis-cellaneous.
8.	**ILA** (Mon, On)	About association, past event and forthcoming events, about publications, and research works and miscellaneous.
9.	**IASLIA** (Mon, On & Off)	IASLIC activities, news on national and international conference/seminar/workshops, miscellaneous news, technology news, special lectures on various topics, different awards and miscellaneous.
10.	**CGLA** (Q, On)	About association, library related published news, professional achievements, recruitments & vacancies, report on many topics, forthcoming events, and article on LISand miscellaneous.
11.	**SIS** (Q, On)	About association, activities, reports, notices on several issues, news on forthcoming events and miscellaneous.
12.	**SLA** (Q, On)	About association,article on several topics, reports and miscellaneous.

(**An**= Annual, **Bi-an =** Bi-annual, **Fr** = Frequency, **Mon** = Monthly, **Off** = Offline, **On** = Online, **Q** = Quarterly)

Table 3 provides the list of 12 state and national level associations that have been publishing newsletters from the beginning. The information stated above is only collected from the websites. All the newsletters are published in regular intervals such as monthly, quarterly, bi-annual, annually. They are available offline, online, or in both formats. According to table 3, all the newsletters are available online. The newsletter presents the whole strategy of the respective associations and functions as an important mouthpiece of different activities of associations.

Table 4: Conference proceedings

Sl. No.	Association	No. (P./E.)	Theme of Conference Proceeding
1.	**BLA**	03 (P.-O.T)	Application of KOHA in libraries
2.	**PLA**	03 (P.-O.T)	1) Ranganathan'sactivities, 2) Public library, 3) academic library
3.	**JILA**	03 (E.-F.T.)	1) Emerging trends in libraries & information services (2014), 2) Re-engineering public library and academic library system in India (2015). 3) Library and information management in digital environment (2017).
4.	**ILA**	31 (P.-O.T)	1) Changing scenario of Library and Librarianship in the Digital era, 2) Technologicalchallenges of the digital age, 3) Managing libraries in the changing information world, 4) Future of public libraries, 5) National information policy, 6) Librarymovement, 7) User study.
5.	**IASLIC**	--	63 conference and seminar organized by IASLIC on the theme: LIS education and profession and allied areas.
6.	**IATLIS**	**06** (P.-O.T)	1) Changing face of LIS education, research and training in the present era.
7.	**CGLA**	05 (E.-F.T.)	1) Role of Government and Public Libraries in the Digital Era, 2) management of e-resources, 3) Future role library and information profession

(E.= E-Copy, F.T.= Full-text, O.T. Only Title, P.= Print)

Table 4 shows the details of published (print/e-copy) conference proceedings available from websites. It is interesting to note that Jharkhand Information and Library Association (JILA) and CGLA have updated full-text e-copy of conference proceedings on emerging trends in LIS and the role of government libraries respectively. Whereas IASLIC have organized 63 conferences and seminar so far but it is not clear from the website how many conference proceedings the association have published so far.

Table 5: Periodical

Sl. No.	Association	Title of Journal (ISSN No.)	P-R	UGC Care listed	Fr.	Accessibility	
						Full - text	Abs-tract (only)
1	KLA	KLA Journal of Information Science and Technology (KJIST)(--)	Y	N	H-Y	Y	N
2	MALA	International Journal of MALA (IJMALA) (–)	-	-	-	-	-
3	DLA	Library Herald (0024-2292)	Y	Y	Q	Y	N
4	WBCLA	College Libraries (0972-1975)	Y	Y	Q	Y	N
5	ILA	Journal of Indian Library Association (JILA) (Print:2277-5145)(Online:2456-513X)	Y	Y	Q	Y	N
6	IASLIC	IASLIC Bulletin (0018-8441)	Y	Y	Q	N	Y
7	AALDI	Indian Journal of Agricultural Library and Information Services (IJALIS)(0974-8776)	Y	N	H-Y	Y	N
8	IATLIS	IATLIS Journal of Library Education and Research	-	-	Q	-	-

(H-Y = Half-Yearly, Q.=Quarterly, N=No, Y=Yes, " "= Information not found)

It is found from table 5 that eight associations have mentioned journal publications. But except the very mention of the title of journals no other information regarding the journals is found from the respective website of MALA and IATLIS. Journals of KLA, DLA, WBCLA, ILA, and AALDI are providing full-text access to journal articles whereas IASLIC Bulletin is providing the abstract of the articles. All the articles are evaluated by the qualified LIS profession to maintain the quality of research integrity in the field of LIS. Thus the process enriches the scholarly communication as well as knowledge domain in the field of LIS.

Table 6: Contents of periodical

Sl. No.	Journal	Content
1.	Library Herald	1) Review of doctoral theses, dissertation & research report, 2) Classification, 3) Biography, 4) ICT & e-resource, 5)Metadata, 6)Information seeking behaviour 9)Preservation and Conservation policy, 10)Library management, 11)Obituary and homage, 12)Book review, 13) News of publications.
2.	College Libraries	1) Application of ICT, social media and library services, 2) Management of academic and other library services, 3) Role of LIS professional in the Digital era, 4) Bibliometrics, scientometrics and infometrics, 4) Information need and seeking beahviour.
3	IASLIC Bulletin	1)Document processing and collection development, 2) Library management and marketing, 3) ICT, social media and role LIS professional, 4) Bibliometrics, scientometrics and infometrics, 5) Information need and seeking beahviour, 6) Preservation and conservation, 7) Open access, 8)Community information services, 9) LIS education.
4.	IJALIC	1) ICT- its use and application, 2) Agricultural library, 3)User study, 4)Trends of online open course, 5) Knowledge management.
5.	JILA	1) Study on different types of library and information centre, 2) Library movement, 3)ICT and web2.0, 4)LIS Curriculum, 5) Research ethics, 6) Green library, 7)Preservation and conservation, 8)Publishing trends, and copyright issues.

Table 6 depicts the content of the periodicals as full-text or abstract form found from the associations' websites. Five journals as presented in table 6 are playing a crucial role for increasing knowledge domain in the field of LIS. The library associations have been publishing several articles in their journals from many years. The journals especially to be mentioned here are Library Herald, College Libraries (WBCLA), IASLIC Bulletin and JILA. The journals mainly seek to share the useful

innovations, both in thought and in practice, with the aim of encouraging scholarly exchange and the possible benefits that are borne of scrutiny, experimentation and debate. Articles present the different approaches, views and opinions that are taken by the scholars and researchers based traditional library activities like collection development and document processing to ICT application along with different management techniques. Thus, the progress in the field of LIS can be stressed from the scholarly publications.

Table 7: Book

Sl. No	Association (accessibility: P./E-bk)	No.	Themes
1	ALA (P.)	70	1)Library Profession, 2) Adult Education, 3) Agricultural Science
2	BLA (P.)	17(Bng.)+ 8(Eng.)=25	1)Library And Information Science and Other Allied Areas
3	IASLIC (P.& Dg.)	7 +2 =09	1) Documentation, 2) LIS profession, 3) National library, 4) Library management and services, 5) Indexing, 6) IASLIC, 7) Scientific communication.
4	PLA(P.)	03	1)Library and Information Science and other allied areas
5	KLA (P.& E-bk)	5 + 1=06	1)Library, 2)Librarianship, 3)Library Classification, 4)Library computerization in India
6	WBCLA (P.)	06	1)An overview to the perspectives on Library and Information Science, 2)Management: college libraries and librarians
7	SIS (E-bk)	01	1)Big data mining: the concepts, methods and applications

(Bng. = Bengali, Dg. = Digitised, E-bk= E-book, Eng. = English, P.=Print)

Like other publications, books also play a vital role in scholarly communication by exchanging information on a larger scale. Table 7 presents the information found from the website about the books that are published by the seven library associations. The numbers of books, their accessibility, mode of publication, and the main theme like the development of the library profession to big data have been covered.

Like the publications several webinars also provide virtual platform for scholarly communications. Many library associations have organised webinar on current LIS

related topics and given opportunity to clarify many queries directly with the renowned resource persons.

Table 8: Webinar

Sl. no.	Associations	Theme	Number
1	BLA	LIS and allied areas, library services in pandemic, miscellaneous	48
2	HLA	LIS and allied areas	02
3	MPLA	LIS and allied areas	14
4	PLA	LIS and allied areas	01
5	JILA	LIS and allied areas	02
6	ILA	LIS and allied areas	12
7	SLA	LIS and allied areas	17

Table 8 presents the list of associations that have organized webinars. The table shows the total number and the topic of the webinars collected from the websites. According to the table, various webinars on Library and Information Science and its related field have been organized by the associations. In this way, webinar tries to maintain the chain of continuous progress in the field of LIS.

7. Findings and discussion :

After analyzing the library associations' websites properly, it is observed that many websites are very well designed. They are publishing books, newsletters, journals, conference proceedings, etc. Through these publications, library associations are participating actively in scholarly communication. All the publications have a great impact on the LIS profession as well as professionals. They are maintaining the quality of their publications. The library associations have published books on different themes related to the library profession. The readers can get them offline, online, or both. Newsletters are being published monthly, half-yearly, quarterly, or even annually. Newsletters carry the image of the library associations as they present the details of their activities. The associations are publishing well-known peer-reviewed journals which are even in the UGC care list, i.e, College Libraries (WBCLA), Library Herald, IASLIC Bulletin, JILA. Researchers are benefitted from the full text or abstract of the well-known journals which are also available through websites. Li-

brary associations also bring out conference proceedings which are the collection of articles by renowned persons presented in different conferences or seminars. All these publications motivate, educate and enrich the students, professionals, and scholars. The learners and the educators are introduced to new trends and developments. They can think of new ideas based on the existing ones. Library associations are also organising webinars frequently on Library and Information Science and other allied fields during the pandemic. As the number of participants is unlimited in the webinar, many scholars, students, researchers can avail useful information globally. During the pandemic, webinars are being proved to be a very successful platform for scholarly communications. Many library associations such as Bengal Library Association, Hyderabad Library Association, Madhya Pradesh Library Association, Punjab Library Association, Indian Library Association, Indian School Library Association are coming forward to fill up the gap of dissemination of information through webinars.

8. Conclusion :

State and national level library associations are using the latest technology and making their websites suitable for scholarly communication through several publications. Library associations have been participating in scholarly communication from the very beginning of their establishment but mainly offline. The processes through which they share, access, disseminate, and discover knowledge is being changed deliberately in the 21st century. Governments around the world are taking an increasing interest in open access because they see instant benefits for professionals and society. Therefore, the importance of having own websites are felt necessary in the present era. Especially when we are stuck at home due to fatal contamination of COVID -19, online publication is the only way to maintain the progress of research work and to continue scholarly communication. So the library associations are using the blessing of WWW for the publications and making scholarly communication successful through their websites. The professional associations like ILA, IASLIC, Association of Agricultural Librarians and Documentalist of India, IATLIS, WBCLA, etc. are trying continuously to publish revised articles, book, newsletter, journal, conference proceeding, organizing webinars on current LIS trends as per the demand to elevate the professionals, scholars, and researchers but still there is the scope of development.

9. Limitations and suggestions :

Library associations' publications discuss matters of professional interest, means of improving education, and the performance of the information services by the application of the latest available technology. But only half of the 27 websites are active on the web. Others have their websites but links are not working or under construction. Even the complete information regarding the publications is also not found. Websites are not upgraded regularly. Minimum information regarding the publication of books, newsletters, conference proceedings, and journals is seen on the websites. All the associations should upload their publications on the website and give full-text access to the same. So the scholars can be benefited much more than before. All the journals should be peer-reviewed and in the UGC care list to maintain the quality. The number of online publications should be increased overall. Webinars should be arranged from time to time to quench the thirst of the scholars and students and links to video recordings should be given on the websites. As the field of LIS is transforming from a traditional to a digital world, all the associations should come forward and make digital publication fruitful through their websites by the side of offline for disseminating knowledge and enriching scholarly communication.

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Scientometric Portrait of Stephen Hawking - the British Physicist and Cosmologist

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Abstract :

The study has been confined to the contributions and the citations received by the famous British physicist and cosmologist Stephen William Hawking reported in the Google scholar database. It investigates the total number of contributions and the most productive years of the great scientist along with the authorship pattern of the contributions made by him and identifying the publishers, who published maximum number of Hawking's works. The study also aims to identify the core journals producing most of his works and finds Physical Review D followed by Physical letters B publishing most of his works, and reveals maximum number of works are contributed in the year 1996; American Physical Society published maximum works; Single authored papers are predominant;Most of Hawking's works are published in English language. Hawking's books received maximum number of citations followed by research articles. MLodinow is found to be the most prolific author working in collaboration with Hawking followed by Penrose.The priority areas in the subject can be identified from the study and the study helps in re-looking into the papers which find utmost importance by studying their citations.

Keywords :

Bibliometric,Citation count, Citation Indexes, Citation ratio, Scientometric portrait, Stephen Hawking

1. Introduction :

Scientometric portraits deal with the biographical study of the individual careers of scientists and researchers, and compares bibliographic analysis of publications or academic and scientific accomplishment. Kademani and Kalyani were the first to use the phrase "Scientometric portrait" to carry out bio-bibliometric studies on eminent scientists, including Nobel laureatessaid by Sedam (2014).

Recently the term "Bio-bibliometrics" is being used for method of regaining and envisioning biological information that uses co-occurrence of gene naming terms in Medical Sciences to generate semantic links between genes. Therefore, it is suggested that "Scientometricportrait" is the suitable phrase for the studies on scientists, andKoganurmath(2014) said "Informetric portrait" for the studies on researchers in other disciplines such as arts, humanities, and social sciences.

The primary concern of this study is to investigate the entire publications of the great scientist Stephen Hawking, one of the pioneers of physics, as well as the citations received by him. This work helps the researchers and knowledge-thrusters to understand the scholarly activities and impactsof Hawking from the viewpoint of Scientometric.

2. Related works :

A number of studies have been carried out in the field of bio-bibliometrics. Most of them are on scientists. Annals of Library and Information Studies (ALIS) top the list among Indian journals in publishing bio-bibliometric studies. The authors found 15 studies related to bio-bibliometrics in ALISby Koley&Sen (2015), Angadi et al., (2006) Hazarika, Sarma&Sen (2010),Mukherjee (2013), Munnolli, Pujar,&Kademani (2011), Kalyane&Sen (2003), Parvathamma&Gobbur (2008), Ray & Sen, (2015), Sinha & Dhiman, (2001).A paper presents an analysis of 422 papers by the Nobel laureate Pierre-Gilles de Gennes, a French physicist, published during 1956 to 1995 in diverse fields of science.The receiving of honours and awards seems to attract more collaborators and hike the productivity rate. The scattering of papers over 146 journals does not follow Bradford's law(Kalyani & Sen, 2017).

Savanur and Sangam(2018)presented a concise sketch of Prof. Peter John Wyllie, pointing on his scientific achievements. His research had a great impact in the fields dealing with terrestrial magmatic phenomena and geology.Munnolli and Kalyane(2003) brilliantly presented the scientometric analysis of the publications of

eminent scientist Ram Gopal Rastogi from 1954-1992. In their paper, they examined 392 scientific papers of Rastogi on different domain of Science.

Mukherjee(2013)presented the bibliometric characteristics including authorshippattern, citations received and relative performance of Prof. Lalji Singh. Another study by Kademani (1998) presented the citations of the publications of Chidambaram, using Citation Index 1958-92. They examined the number of citations per paper and the categories of citing documents and the distribution of citation among them. Rushton(2001) described Eysenck's productivity, his citations,students,departments, journals, personality in relation to his scientific achievement, legacy, and a personal note of appreciation.

3. Objectives of the study :

- To investigate the total number of contributions made by Stephen Hawking;
- To study the most productive years;
- To identify the authorship pattern;
- To identify the core publishers;
- To identify the core journals;
- To find the language wise distribution;
- To identify top cited works;
- To identify the most prolific co-authors;
- To compare and analysis of the citation-based indexes.

4. Importance of the study :

Stephen Hawking is one of the doyens of physics. To get a clear picture of the entire contributions of the renowned scholar, in the field of science, this type of bibliometric analysis is very essential.We can also get an idea about the subject fields in which Stephen Hawking has laid much emphasis and can also identify the untouched areas of research and thereby work on them.

5. Methodology adopted :

To conduct this study, the following steps have been followed :

- The entire contributions of Stephen Hawking with their corresponding citations are collected from the Google scholar database during March 2019.
- Then these are arranged individually accordingly to the parameters mentioned in the objectives into the excel sheet.
- The data collected is analyzed to find the total contributions, most productive years and several citation-basedindexes.
- Finally, from this study, interpretations are made and conclusions are drawn, with some suggestions and scope for further work.

6. Data analysis and interpretation :

6.1.Top ten contributing year :

The following table show the most productive year of the scientist and also represents either the productivity is continuing for a long timeor not. The following table depicts that the excellencies of Stephen Hawking did not stop at a point, but was ever continuous.

Table 1: Number of Publications Year-wise (From Maximum to Minimum)

Publication Year	Total No. of Publication	Percentage
1996	25	5.28
2002	24	5.07
2010	21	4.44
2015	21	4.44
1999	18	3.81
1995	17	3.59
2011	17	3.59
2005	15	3.17
2000	13	2.75
2003	13	2.75

The above table shows that the maximum number of publications were contributed in the year 1996,followed by the years 2002, 2010 and 2015 i.e. each have above20 publications (5.28 4.43%). It also reveals that he was too much productive till his death.

6.2. Authorship Pattern of Stephen Hawking's Contributions :

Authorship pattern provides worthy information concerning characteristics of authors, their collaboration, measuring and monitoring research activities among others (Keadzo and Grace, 2008). Teamwork among scientists shows that they are working together and pursuing a target (Kundra, 1996).Authorship pattern represents the number of authors per paper.

Table 2 : Author vs. works

No. of Author	No. of Works	Percentage
One	281	59.40
Two	123	26.00
Three	33	6.97
Four	25	5.28
Five	9	1.90
Six	2	0.42
TOTAL	473	100

The table 2 shows that 281 papers i.e.(59.41%) were made by single author (i.e. Hawking himself), followed by 123 contributions (i.e.26.004%) by 2 authors and 33, 25, 9 and2 contributions were made by 3,4,5 and 6 authors respectively. So, it can be interpreted that Hawking preferred working alone or maximum with any one co-author during his entire lifetime.

6.2.1 Single Authorship Vs Multiple Authorship

Table 2.1: Year-wise authorship-pattern

Pub. Year	No. of Authors						Total No. of Publication
	One	Two	Three	Four	Five	Six	
1965	2						2
1966	3	1					4
1967	1						1
1968	1	1					2
1969	2						2
1970	1	1					2
1971	2	1					3
1972	1	2					3
1973	1	2	1		1		5
1974	3	1					4
1975	2						2
1976	2	1	1				4
1977	2	3					5
1978	2	2	1				5
1979	2	1					3
1980	1						1
1981	4		1				5
1982	4	1	1				6
1983	2	3		1			6
1984	4	2					6

1985	5	3	1				9
1986	1	1	2				4
1987	7	1					8
1988	8	2	1				11
1989	6	1					7
1990	5	2		1			8
1991	5	1					6
1992	5	4					9
1993	6	3	2				11
1994	9	3					12
1995	5	6	1	5			17
1996	10	9	3	3			25
1997	3	6					9
1998	3	7	1		1		12
1999	6	6	4	1	1		18
2000	8	2	2	1			13
2001	7	1	3				11
2002	16	7				1	24
2003	8	1			3	1	13
2004	9	1		1			11
2005	14			1			15
2006	6	2	1				9
2007	3	2	1		2		8
2008	7	1	1	1	1		11
2009	7	1					8
2010	11	9	1				21

2011	8	9					17
2012	4	1					5
2013	6						6
2014	7	2		3			12
2015	16	2	1	2			21
2016	7	1	1				9
2017	3	1	1	1			6
2018	3	1		2			6
Not Retrieved	5	2	1	2			10
TOTAL	281	123	33	25	9	2	473

Table 2.1 shows the detailed break-up of single authorship and multiple-authorship over the years. From the years 1965 to 2018 single authored papers are predominant over multi-authored papers in almost forty years. In rest of the fourteen years two-authored papers are more or mostly same as single authored papers. Only in the year 1995 number of four-authored papers are same as the single authored papers.

6.3. Publisher Wise Distribution of Publications : (Core Publishers Who Published > = 5 works):

Publisher wise distribution of publications shows the authors flair to publish in a specific publication house. Additionally, it also shows which publisher preferred which type of publications. The table below depicts the publisher-wise distribution of publications.

Table 3: Publisher Wise Distribution of Publications

Publishers	No. of Publications	Percentage
American Physical Society (APS)	51	10.78
Elsevier	25	5.29

Springer	17	3.59
Cern	15	3.17
Harvard University	14	2.96
Arxiv	8	1.69
Amfora	7	1.48
Iopscience	6	1.27
Royal Society Publishing	6	1.27

The table 3 shows top ranking publishers publishing Hawking's works in maximum. Out of the total 473 publications, APS published maximum no. of Hawking's works i.e. 51 in number (10.78%) followed by Elsevier who published 25 number of works(5.28%), Springer published 17 works(3.59%) and so on.

6.4. Top ten journals publishing Hawking's articles

Every famous author is found to have certain preferable journals where he or she publishes his or her intellectual thought content. The table 4 shows the renowned journals where maximum numbers of Hawking's works are published.

Table 4 : Top ten journals publishing Hawking's articles

Sources	No. of Publications	Percentage
Physical Review D	44	9.30
Physics Letters B	13	2.75
Communications in mathematical Physics	11	2.33
Nuclear Physics B	11	2.33
Physical review letters	7	1.48
Proceedings of the Royal Society of London	5	1.06
Quadernsd'arquitectura i urbanisme	4	0.85
Monthly Notices of the Royal Astronomical Society	3	0.63
Journal of High Energy Physics	3	0.63
Classical and Quantum Gravity	3	0.63

This table 4 shows the 10 journals where most of the works of Stephen Hawking has been published. Among these journals, in Physical Review D maximum no. of works have been published i.e. 44 in number, followed by Physics Letters B i.e. 13 in number. Journals like Nuclear Physics B, Communications in Mathematical Physics, Physical review letters published 11,11 and 7 articles respectively. Hawking's works are all published in top class Journals of Physics with high impact factor.

6.5.Language wise distribution of the collections

English is found to be the most preferred language for expressing the thought content by most of the famous scientists and Hawking is no exception. The table below shows the language wise distribution of collections.

Table 5: Language wise distribution of collections

Sl. No.	Language	No. of Contributions	Percentage (%)
1	English	367	77.58985
2	Others	106	22.41015
TOTAL		473	100

This table 5 portrays that out of 473 publications, 367 (i.e. 77.59%) are published in English language and 106 only (i.e.22.41%) are published in other languages. This interprets that Hawking preferred English language over other languages as it is internationally accepted.

6.6. Document types of Hawking's works

Hawking was equally promising in authoring books and research articles for reputed publication houses.

Table 6: Document types of Hawking's works

Sl. No.	Document Types		No. Of Works
1	Printed Material	Book(Original and translated works)	202

		Research Paper(Both in print & Online)	136
		Article(Newspaper and Magazine)	19
		Proceeding	8
		Symposium	3
		Book chapter	2
		Book review	2
		Essays	2
		Lecture	9
		Speech	2
		Popular Saying	1
2	Sound Recording	Interview	3
		Speech	1
3	Video Recording	TV series	1
		Video Episode	1
		Speech	2
4	Electronic Resources	PDF	23
		Web page	21
		Blog post	1
5	Not retrieved		34
	Total		473

*Classified according to AACR IIR 2004 edition

The table 6 depicts that the original and translated books of Hawking are the most common document type with 202 works followed by research paper, both printed and online publications, 136 in number. Apart from Printed materials, the other document types of Hawking's works include printed material, Sound recording, Video recording and Electronic resources. The document types of thirty-four works could not be clear due to insufficient data in Google scholar.

6.7. Top Co-authors of Hawking

The study reveals that Hawking preferred to work alone rather than in collaboration probably because of his locomotive hindrances. But still some co-authors who worked with Hawking for maximum time are depicted in the table below.

Table 7: Core Co-authors of Hawking

Sl. No.	Name of Authors	No. of Contributions
1	L Mlodinow	21
2	R Penrose	13
3	GW Gibbons	11
4	R Bousso	9
5	L Hawking	8
6	T Hertog	7
7	E Lillestøl	6
8	I Sellevåg	6
9	GM Fraser	6
10	DN Page	5

This table shows the core co-authors of Stephen Hawking. L. Mlodinow collaborated maximum i.e.21 works with Hawking, followed by R. Penrose, G. W. Gibbons, R. Bousso and so on. Hawking actually was more comfortable to work alone than that in collaborationand it has already been seen from table 2 and table 2.1.

6.8. Top citation receiving works :

The following table shows which works of the scientist are regarded as the burning topic of research. Day by day these works gained more popularity among the fellow scientists.

Table 8 : Citation wise distribution of works

Title	Cites	Percentage
The large-scale structure of space-time	12073	12.69
Particle creation by black holes	10918	11.47
A brief history of time: from big bang to black holes	6981	7.34
Black hole explosions?	4725	4.97
Wave function of the universe	3415	3.59
Action integrals and partition functions in quantum gravity	3057	3.21
The four laws of black hole mechanics	2794	2.94
Cosmological event horizons, thermodynamics, and particle creation	2780	2.92
The development of irregularities in a single bubble inflationary universe	2153	2.26
Breakdown of predictability in gravitational collapse	1979	2.08

Table 8 shows to ten cited works of Hawking. Total seventeen publications received more than 1000 citations. Out of these the four most highly cited works are The Large-Scale Structure of Space-Time (12073) followed by Particle Creation by Black Holes(10918), followed by A Brief History of Time: From big bang to black holes and Black Hole Explosions which received 6981 and 4725 citations in number respectively. This clearly proves how inspiring and pioneering were the works of Hawking which received acknowledgement throughout the world.

6.9. Citation Indexes

Table 9 : Different citation indexes

Citation Indexes	Values
Total Citation	95155
Total Paper	473
No. of Cited Paper	405
No. of Uncited Paper	68
Cited-Uncited Ratio	5.96 : 1
No. of Low-Cited paper (=5)	141
No. of High-Cited Paper (=25)	164
High-Low Cited Ratio	1.16 : 1
h-index	103
h-core citation	10609
h-core Excess citation	79647
Tail citation	4899
g-index	308
i10 index	219
e-index	290.7679
R index	308.472
a index	923.835
g/h Ratio	2.99 : 1

High value of total citation shows the tremendous influence of his research works and the value of h-index and i-10 index also shows the high productivity of the scientist. The h-core excess citation shows the received citations are not uniformed, from e-index and R-index it is also reestablished that the citations and highly skewed in nature.

7. Major findings :

The Large-Scale Structure of Space-Time(12073) is the highest cited work, L. Mlodinow is the top co-author and favored language in most cases is English.

The maximum number of publications were contributed in the year 1996, followed by the years 2002, 2010 and 2015.

Physical Review D (44) and American Physical Society (51) are the core journal and publisher.From the years 1965 to 2018 single authored papers are predominant.

High value of total citation shows the tremendous influence of his research works and the value of h-index and i-10 index also shows the high productivity of the scientist.

8. Conclusion and future direction :

Stephen Hawking was a real gem in the field of physics and cosmology. He was highly acknowledged by his peers and that can be revealed from the citations he received throughout the period. The citation pattern, high value of h-index (103) and total citation count (95155) shows the excellence, acceptance, productivity and uniqueness of the scientist. The continuous publications indicate his meritorious services and dedication to work and passion towards research. He can be a role model and an inspiration for the research scholars and students in the field of natural science.

This work ends with the expectation that it may help the researchers and information professionals a lot. One may extend this study to find out the co-citation coupling, bibliographic coupling and institutional linkage etc. In spite of his locomotive hindrances he was a successful scientist and an inspiration to many others who could take his example and say 'where there is a will there is a way'.

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Measuring Research Trends of Physical Education Department PhD Thesis Titles using Text Mining Technique

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Abstract :

In India Physical Education was taught for over hundred years as a subject in colleges and universities, which was classified and placed under major subject Education. Research in Physical Education flourished in India from 1972. The research trends in Physical Education subject for past ten years in Tamil Nadu Physical Education and Sports University (TNPESU) was not measured. Hence this study was carried out to find out the research trends in physical education. The PhD research thesis Titles awarded by TNPESU in Physical Education Department from 2009-2019 ten years was selected as data for this study. The thesis titles words grouped into four main categories namely type of research, core/interdisciplinary subject, variables selected and type of subject choices for study. A total of 209 research topics were analyzed for this study and the inferences were drawn. From the analysis it was found that 158(75.60%) research topics are found to be experimental research in which 96(60.75%) research are sports training methods based research which is core of physical education subject. Majority of the research selected physical, physiological and psychological variables. Fifty five percent of research scholars chose players as their subjects and the rest of 45% chose school, college, obese, students for their study. Therefore form this study the research trend for past ten years was mapped and presented.

Keywords :

Ph D Thesis Titles, Physical Education, Research Trends, Text Mining

1. Introduction :

Physical Education is a branch of Education subject which was taught for over hundred years in India. The main focus of this subject is to improve the health of the educator as well as the student community. Research and advancement in many subjects takes place all over the world. The trend of research in a specific field is measured now and then, to know the area of research focused by the scholars and to know the dealt research in a particular subject. This will bring the trend of the research happening in a particular subject. Thereby the scholar community shall avoid duplication of study and concentrate on the new area where real problems may be identified and scientific research solutions be complimented. To know the research trend of Physical Education in TNPESU this study is initiated. No such study was carried out for past ten years.

The prime aim/objective of higher education institutions is to do teaching, research and to provide extension works. The second foremost duty of Higher Education Institutions is to undergo research. Research publications, research projects, Impact of research of particular authors affiliated to a particular HEI's brings an image to that particular institute. Hence NIRF, NAAC gives highest importance to the above said activities. Therefore HEI's are in a competitive academic community and working hard in their specific subjects to achieve maximum score in that competition. Supervisors and scholars are struggling to publish research works in highly indexed Journals.

Librarians and academic professionals collect the data from the indexing journal database and publish articles revealing which topic is predominantly published in a particular journal over a period of time. This becomes hands on guide to new scholars to find appropriate new topic for their research.

Such an attempt has been initiated to know the research trends of physical education in TNPESU. To proceed further past published literatures have been reviewed by the author to know the ways and means of measuring the research trends in other subjects. The literatures reviewed for this study is presented by the author in review of literature part.

2. Review of literature :

Scalfani (2017) Published a work by analyzing ten thousand chemistry thesis

and dissertation titles from 1911-2015. He has collected data from nine research universities in United States. The collected texts were analyzed using MATLAB. Text mining options was used in MATLAB to analyse the data. A total of 9,684 titles was included for this study and it was found that a total of 115,008 words and 12,886 unique words. The author has limited his study to 100 unique words to draw inference. The author has found frequency of bigram word and trigram word and also found most commonly used words. The author also compared the year with frequency of words used during a particular period. From this study the author has found that in thesis titles words like synthesis, spectra, reaction, application, maces spectra and nuclear magnetic resonance were most commonly used by the students and scholars.

Nagarkar(2015) in his article measured the word Information Science/Library Science published in Web of Science database Indexed Journals from 1999-2013. The author's main focus is to adopt text mining concepts and to measure the major country, institutions, departments and individual contributing to information science/ library science. The author used Excel, Pajek, VOS Viewer to analyse the data retrieved from Web of Science database. From this study the authors revealed Chen & Friedman as the most prolific authors, USA the highest number of articles contributing country in Information Science/Library Science. And in Journal of American Medical Informatics highest number of articles being published related to the choose word.

Derysdale (2013) have undergone a study on blended learning research topics and analyzed 205 research topics for this study. This study was initiated to find the trend of blended learning research topics. The authors divided the topics into nine major topics with sub-topics. In this paper the authors have identified the patterns of research in blended learning. The authors highlighted the research carried out and the research gap available, which becomes a tool for further researchers.

3. Scope :

For this study the author has reviewed the above specified literatures. From the literatures the author has found that mapping of PhD research topics in specific subjects is in practice. And the author has decided to find the research trend in Physical Education subject. Hence this study is initiated to know the research trend in Physical Education.

4. Objectives :

The main objectives of this study are :

I. Which words are frequently used in Physical Education research thesis topics.

II. Which type of research design the scholars mostly choose for their study.

III. Which area in Physical Education/Interdisciplinary subjects identified as experimenting technique to pursue the research.

IV. Which variables research scholars mostly select for their study.

V. Which group of people predominantly selected as subjects for research.

5. Methodology :

TNPESU offers PhD programme in Physical Education from 2007 onwards under Teacher Education Faculty. The PhD degrees were awarded from the year 2009-2019. For this study he research topics submitted to this University for ten years was selected as data. A total of 209 thesis topics collected and the topics word separated using Excel. Therefore n=209. The separated words file was analyzed using Voyant tools online. The methodology adopted to analyse the file is Voyant tool online analyzing method. The analyzed data is presented in results and discussion part. The author have excluded certain words namely Determiners (a, an, the, its), Prepositions (on, at, with, among) and Conjunction (and, for) Words and used only the words which implies the research meanings.

6. Results and discussion :

A total of 209 research topics which was awarded by TNPESU from 2009-2019 was selected for analysis. The selected topics separated into individual words in excel using comma separated value. And the .csv file analyzed using Voyant Tools from the analysis the following results were drawn and the inferences was arrived.

From table 1, it was found that research scholars coined their research topics using a total of 3874 words counted from 209 topics. In which 2823 words are physical education related scientific terms and remaining 1051 words are Conjunctions, Determiners and Prepositions. From the table it is summarized that 561 distinct terms, 541 unique words and 321 single occurrence terms are used to present the research topics. The vocabulary density is found to be 0.215. From the table-1 it

was inferred that 72.87% (2823) of terms are scientific in nature. Hence these terms alone used to find the research trends in Physical Education.

Table 1: Physical education Ph D thesis titles words total count

Sl.no.	Words	Total
1	Total Words	3874
2	Scientific Words Used for Topics	2823 (72.87%)
3	Determiners, Prepositions, Conjunctions Words	1051 (27.13%)
4	Distinct Words	561
5	Unique Words	541
6	Single occurrence Words	321
7	Vocabulary Density	0.215

***Voyant tools analyzed data**

Table 2 shows most frequently used terms in PhD topics. In the table the author has restricted the frequent total count from 152 to 76. Therefore from the Table-2 it was found that the terms like Selected, Training, Variables, Physiological, Effect, Players and Physical were frequently used in the Physical Education Ph D research topics. The total counts are specified in the table.

Table 2: Most frequently used terms

Sl.no.	Frequently used terms	Total
1	Selected	152
2	Training	126
3	Variables	123
4	Physiological	89
5	Effect	83
6	Players	83
7	Physical	76

***Voyant tools analysed data**

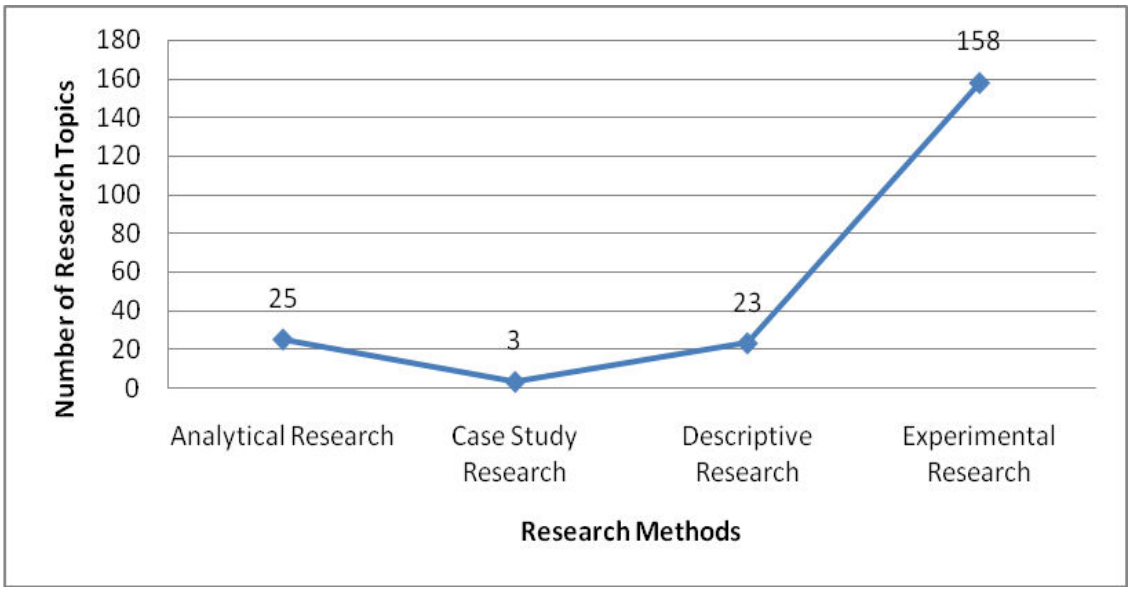
To find the type of research methods adopted the author classified the research topics into four major categories of research methods. Among 209 research topics

analyzed for this study it was found that 158(75.60%) topics belongs to Experimental Research methodology group which occupy first rank, 25(11.96%) topics belong to Analytical Research which occupy second rank, 23(11%) belong to Descriptive research and only 3(1.44%) are Case Study research methods. Hence from this table it was revealed that 75.60% of Physical Education research adopts Experimental research method techniques for their study. Followed by this 11.96% of PhD topics adopts Analytical research methods and 11% adopt Descriptive research method. Finally only one percent research adopted case study method.

Table 3: Type of research design adopted

Sl. no.	Research design	Total research count	Percent	Rank
1	Analytical Research	25	11.96	II
2	Case Study Research	3	1.44	IV
3	Descriptive Research	23	11.00	III
4	Experimental Research	158	75.60	I
		209	100	

Figure 1: Research methods adopted in physical education research



From the Figure-1 this is stated that most of the research carried out in Physical Education subject in TNPESU adopts Experimental research methods only. This shows that the Experimental research methodology is the trend which was adopted by majority (75.60%) of physical education researchers.

From table 4, it was found that which predominant area of physical education subject or interdisciplinary subject researchers selected as experimenting group. The table proves that 96 topics covers sports training methods groups, 21 yogic practices groups, 16 aerobics group, 12 exercise groups, etc. Among 158 experimental research methods topics 60.75% of the topics belongs to sports training methods groups, 13.29% belongs to yogic practices group, 10.13% aerobic group, 7.59% Exercise group. This shows that in Experimental research physical education scholars choose 83.54% core subjects as experimenting group and 16.46% Interdisciplinary subject as experimenting group.

Table 4: Area in physical education/interdisciplinary subjects identified as experimenting technique

Sl. No.	Experimenting technique	Total study	Core/Interdisciplinary	Percentage
1	Sports Training Methods	96	Core	60.75
2	Yogic Practices	21	Interdisciplinary	13.29
3	Aerobic	16	Core	10.13
4	Exercise	12	Core	7.59
5	Music	2	Interdisciplinary	1.27
6	Dance	3	Interdisciplinary	1.90
7	Learning	2	Core	1.27
8	Psychological	2	Core	1.27
9	Physical Fitness	4	Core	2.53
Total		158	Core-132 Interdisciplinary-26	100 Core = 83.54 Interdisciplinary =16.46

N=158

Also table 4A proves that among 158 Experimental study topics 45.57% of topics

adopt two group designs which was found to be the predominant group choose for undergoing research. Followed by this 32.91% choose three group and 21.52% choose single group. The table-4A clearly predicts that in Physical education research selecting two experimental groups design is the trend of the research.

Table 4A : Experimenting technique groups

Sl. No.	Experimenting technique	Single group	Two group	Three group	Total
1	Sports Training	13	45	38	96
2	Yogic Practices	8	8	5	21
3	Aerobic	4	6	6	16
4	Exercise	2	9	1	12
5	Music		2	1	2
6	Dance		2	1	3
7	Learning	1		1	2
8	Psychological	2			2
9	Physical Fitness	4			4
		24(21.52%)	72(45.57%)	52(32.91%)	158

The Variables mostly selected by the research scholars is presented in Table-5. From the table it was found that research scholar's selected Physical variables 58(27.75%) followed by Psychological 56(26.79%), Physiological 50(23.92%), and Game Specific Sports Skills 32 (15.31%). Therefore the sequence of selecting variables is Physical, Psychological, Physiological and Game specific sports skills.

Table 5: Variables research scholars mostly selected

Sl. no.	Variables	No. of topics	Percentage
1	**Psychological** Biomotor-8 Motor-30 Psychomotor-5 Psychology-13	56	26.79

2	**Physical** Anthropometric-7 Physical-42 Fitness-4 Speed-3 Strength-2	58	27.75
3	**Exercise** Physiological-18 Health-13 Biochemical-2 Bodycomposition-3 Backpain-2 Lipid Profile-2 Liver-1 Lung-2 Cardiac-1 Metabolic-1 Morphological-1 Hematological-3 Musculoskeletal-1	50	23.92
4	**Biomechanics & Kinesiology**	3	1.43
5	**Game specific Skills & Performance** Skill-21 Performance-11	32	15.31
6	**Psycho-social**	1	0.48
7	**Learning**	4	1.92
8	**Case Study**	3	1.43
9	**Others**	2	0.97
		209	100

Finally to achieve the objective five of this study the author has collected the data pertaining to population or subjects selected in PhD research topics for undergoing the experiments. The predominant population selected is given in Table-6 and it was found that 116(55.50%) studies select various sports persons/players as their subjects which are found to be the predominant group, followed by this school boys and girls, College men and women, etc as their experimenting subjects.

Table 6 : Group of people predominantly selected as population/subjects for research

Sl. No.	Group of people	Total study	Percentage
1	Players Athletes 8 Ball Badminton 2 Basketball 15 Case study 2 Kho-kho 3 Kabaddi 4 Hockey 16 Handball 4 Cricket 7 Football 25 Volleyball 18 Players 9 Tennis 2 sociology 1 116	116	55.50
2	School Boys and Girls	21	10.04
3	College Men and Women	27	12.92
4	Men and Women	9	4.30
5	Obese Students	9	4.30
6	Intellectually Challenged Children	5	2.39
7	Sedentary Men	5	2.39
8	Working Women	2	0.96
9	Information Technology Professionals	3	1.44
10	Police	2	0.96
11	Diabetes	2	0.96
12	Teaching Professionals	2	0.96
13	Others	2	0.96
14	Technical Officials	1	0.48
15	Labours	1	0.48
16	Juvenile Delinquents	1	0.48
17	Active Smokers	1	0.48
	Total	209	100

7. Conclusion :

Based on the results and discussions conclusions were drawn for this study. From the analysis the research trend of Physical Education is mapped and presented in conclusion. It was found that majority 158(75.60%) of research topics are found to be experimental research design based. Predominantly 132(83.54%) topics belongs to core experimenting techniques, such as sports training methods, exercise, aerobics, learning, physical fitness and psychology based research which is core of physical education subject. Rest 26(16.45%) of research are interdisciplinary in nature. Most of the research 72(45.57%) selected two groups. Majority of the research selected physical, physiological and psychological variables. Fifty four percent of research scholars choose players as their subjects and the rest of forty six percent choose school, college, obese, students for their study.

Since Physical Education imparts healthy way of life style and sports participation to youngster of this nation to achieve excellence in sports. The ultimate aim is to excel in sports. Indian youths are still lagging in excelling in International sports events. Therefore studies should come up in future to know the real problems faced by the entire sports industry and the real solution should be found and it should reach the needy person. It is suggested to the aspiring scholars to identify real problems faced by the people associated with sports and provide scientific solutions for those problems if possible reveal the secret to one and all in public domain thereby our nations dream will be fulfilled.

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Evaluation of Chemical Science Web Resources

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Abstract :

The web has become an important source of information for users of all age. The web also does not restrict anyone from publishing the information. But, credibility is the major issue faced by web resources and this study aims to find whether the web pages and web sites in the field of Chemical Science adhere to the web standards for content, coding, and presentation. The web evaluation tools were used for testing the web pages and the tool reports were analyzed and findings are recorded.

Keywords :

Chemical Science, Content Quality, Credibility, Evaluation, Internet resources, Web resources

1. Introduction :

Publishing information on the web is not restricted to experts; anyone can publish anything on the web. Information on the web is mostly unregulated with content quality varying greatly across websites, ranging from factually correct to misleading or contradictory information. It is the responsibility of users to verify the content before using it for their required purpose. Users cannot be called as information literate if they just have the ability tolocate the information. Information literacy can be defined as "a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the information needed" (Association of College and Research Libraries, 2000).

There is a rapid rise in the web usage; web has become an important source

of information for users of all age. Among the many web resources, Wikipedia is one of the famous and most visited web resources. Wikipedia represents a new generation of web-based research tools utilized by not only the general populace, with nearly 36% of the general population of adult Internet users, and higher percentages among those users with a college degree and users in the 18-24 age range (Rainie&Tancer, 2007). However, authority is perhaps the most problematic issue faced by Wikipedia. Wikipedia is far from a perfect information source. It demonstrates some serious flaws, most notably the lack of what might traditionally be considered "authoritative" sources. These flaws have, in some cases, led to a bias against Wikipedia (Waters, 2007).

Realizing the credibility as the major issue faced by web resources, this present study aims to evaluate the resources available on the web. The web covers almost all the subject fields and each subject has millions of pages of web content. Covering all the subjects is beyond the capacity of this study. Therefore, this study aims to evaluate web resources in the Chemical Science discipline.

2. Literature review :

Muhammad et al (2021) identified important factors through a detailed literature review, classified them, and prioritized the most critical among them through the FAHP methodology, involving relevant users to propose a usability evaluation framework for academic websites. To validate the proposed framework, five websites of renowned higher educational institutes (HEIs) were evaluated and ranked according to the usability criteria. As the proposed framework was created methodically, the authors believe that it would be helpful for detecting real usability issues that currently exist in academic websites. Allison et al (2019) aimed to review and define existing worldwide methodologies and techniques to evaluate websites and provide a framework of appropriate website attributes that could be applied to any future website evaluations. Zahran, Al-Nuaim, and Benyon, (2014) proposed a novel approach to view and select evaluation methods based on the purpose and platforms of the evaluation. It has been shown that the choice of the appropriate evaluation method (s) depends greatly on the purpose of the evaluation. Aljuboori,Yunji and Franz (2011) presented a general survey of the current Web Site Measurement Approaches of some famous web site evaluation systems and tools worldwide and focuses on web site evaluation by using structural evaluation and scope of busi-

ness-based content comparison. Kalra and Verma (2011) revealed that there are many inconsistencies and terminological issues and many effective methodologies/ techniques for websites evaluation which are practiced at international level but are not being used in such studies in India. Two major quality components viz. 'usability' and 'usefulness' covering the various evaluation indicators at 'indicative' and 'illustrative' level have been examined in their study.

3. Objectives of the study :

The main objectives of the present study are:

- To check the availability of metadata tags which are helpful in search engine optimization.
- To find whether schemas are effectively being used by the web pages.
- To find the accuracy in HTML and CSS coding.
- To check the text/HTML ratio.
- To check the web page speed and whether their hyperlinks are properly working.
- To check whether web pages are developed for quicker and better experience on mobile platforms using the dedicated Accelerated Mobile Page (AMP)
- To check whether analytics are being used to monitor the performance of a website for further improvement.

4. Scope of the study :

There is a huge volume of web resources available on the Internet. The web covers almost all the subject fields and each subject has millions of pages of web content. Covering all the subjects is beyond the capacity of this study. Therefore, this study aims to evaluate web resources in the Chemical Science discipline. The study is confined to evaluate 300 web resources in Chemical Science listed on the Google search engine and the criteria of selecting these 300 web resources is based on GoogleTrend service to find the top 30 keywords in the field of Chemical Science. The top 30 keywords are Chemistry, Chemical reaction, Chemical Engineering, Chemical Science, Chemical compound, Equation, Chemical change, Chemical

element, Water, Chemical formula, Energy, Chemical property, Chemical equation, Council of Scientific and Industrial Research, Atom, Technology, Chemical bond, Chemical substance, Acid, Solution, Laboratory, Periodic table, Matter, Molecule, Formula, Property, Calcium, Chemical nomenclature, and Non-metal.

5. Methodology :

The methodology for evaluating the web resources in Chemical Science discipline in this study is divided into four phases.

Phase 1. The parameters for evaluating the web resources have been framed. The web testing tools for evaluating the web resources has been selected and finalized for the study.

Phase 2. Each keyword for search was selected using Google Trends service and top ten web resources listed for each keyword search was selected as sample for study.A total of 300 Chemical Science web resources were selected using the Google search engine.

Phase 3. All 300 web resources were tested using web evaluation tools.

Phase 4. The reports generated by the web testing tools have been used for analysis and interpretation of data.

6. Data analysis :

The Search Engine Optimization (SEO) is a complex and rapid changing process and each website competes with others to be on top in the results page. There are many tools available on the web that evaluates the web pages for search engine ranking and some of these tools were selected for analysis of our sample web pages. The SEO Quake tool was used for metadata, schema, text versus HTML ratio, AMP analysis, similarly W3C Unicorn tool for HTML and CSS validation, Dead Link Checker for checking broken links, Google Analytics as website analytics tool while Google Lighthouse was used for analysing page speed insights. The reports from the web evaluation tools were analyzed and are presented in this section.

6.1 Metadata :

The meta tags are used to describe the webpage to help search engines better

recognize the content on a webpage for indexing. The meta tags can be used to specify the character set, keywords, description about the page, author credentials etc. The meta keywords tag is used to list the main words that form part of the webpage or a word about which the page is all about. Similarly, the meta description is a short summary of what the page is all about. This description is used as a small snippet under the website URL in the search engine results page.

Table 1: Type of URL versus keyword metadata wise distribution

	Metadata Keyword			Metadata Description		
URL Type	Yes	No	Grand Total	Yes	No	Grand Total
com	54	101	155	110	45	155
	34.84%	65.16%	100.00%	70.97%	29.03%	100.00 %
edu	17	40	57	22	35	57
	29.82%	70.18%	100.00%	38.60%	61.40%	100.00 %
gov	5	18	23	8	15	23
	21.74%	78.26%	100.00%	34.78%	65.22%	100.00 %
info	2	4	6	5	1	6
	33.33%	66.67%	100.00%	83.33%	16.67%	100.00 %
net	1	2	3	2	1	3
	33.33%	66.67%	100.00%	66.67%	33.33%	100.00 %
org	11	45	56	26	30	56
	19.64%	80.36%	100.00%	46.43%	53.57%	100.00 %
Total Count	**90**	**210**	**300**	**173**	**127**	**300**
Total Percentage	**30.00%**	**70.00%**	**100.00%**	**57.67%**	**42.33%**	**100.00 %**

As shown in table 1, about 70% of web pages were not having the meta keyword tags defined in the HTML coding. Domain category wise analysis to know the availability of this tag shows that around four-in-ten commercial web pages, and around three-in-ten .net and .info domain web pages were found to have the meta keyword defined for ease in indexing in search engine databases. The metadata description tag used for defining what the web page is about is found to be available in 57.67% of web pages. Around 71% of commercial web pages, 46.43% of org domain web pages, 39% of educational, and 35% of web pages were found to have the metadata description tags in their source code.

6.2 Metadata schema :

Schema is a vocabulary that is used to mark up the contents on a webpage to give meaning to the content so that it is better understood and served by the search engine to its users. It is noted that websites with schema markup are ranked better than the ones without the markup. But, the study found that overall only around 40% web pages used a schema for defining the contents on the web pages. Across the entire domain categories, there was not a single domain category above 50% to have used any type of schema in their web pages. It is interesting to observe that the commercial web pages implementation of schema is comparatively less with around 39% of schema implementation (SeeTable 2).

Table 2 : Type of URL Versus Schema

	Schema Availability		
URL Type	**Yes**	**No**	**Grand Total**
Com	60 38.71%	95 61.29%	155 100.00%
Edu	28 49.12%	29 50.88%	57 100.00%
Gov	8 34.78%	15 65.22%	23 100.00%
Info	1 16.67%	5 83.33%	6 100.00%
Net	 0.00%	3 100.00%	3 100.00%
Org	24 42.86%	32 57.14%	56 100.00%
Total Count **Total Percentage**	**121** **40.33%**	**179** **59.67%**	**300** **100.00%**

6.3 HTML and CSS Validator :

Just like the creation of any application needs a computer language, a webpage is created using the markup language, the Hyper Text Markup Language (HTML). Every language has its own vocabulary and rules of writing as a standard. The HTML and CSS validation is important to check the syntax of webpages and make sure that the designer has coded the webpages correctly and that the web browsers understand and interpret how the content needs to be displayed on the screen.

Table 3 : Type of URL Versus HTML Checker

	HTML Checker Test			
URL Type	**Passed**	**Failed**	**NA**	**Grand Total**
Com	3 1.94%	147 94.84%	5 3.23%	155 100.00%
Edu	0 0.00%	56 98.25%	1 1.75%	57 100.00%
Gov	0 0.00%	23 100.00%	0 0.00%	23 100.00%
Info	0 0.00%	6 100.00%	0 0.00%	6 100.00%
Net	0 0.00%	2 66.67%	1 33.33%	3 100.00%
Org	0 0.00%	56 100.00%	0 0.00%	56 100.00%
Total Count **Total Percentage**	**3** **1.00%**	**290** **96.67%**	**7** **2.33%**	**300** **100.00%**

It is quiet surprising to know that around 97% of web pages failed the HTML test. It indicates that they are some flaws in the HTML coding of web pages and the World Wide Web Consortium standards on HTML coding of webpages have not been properly implemented (See Table 3).

Table 4 : Type of URL Versus CSS Validator

	CSS Validator Test			
URL Type	**Passed**	**Failed**	**NA**	**Grand Total**
Com	15 9.68%	133 85.81%	7 4.52%	155 100.00%
Edu	5 8.77%	47 82.46%	5 8.77%	57 100.00%
Gov	6 26.09%	17 73.91%	0.00%	23 100.00%
Info	2 33.33%	4 66.67%	0.00%	6 100.00%
Net	0.00%	2 66.67%	1 33.33%	3 100.00%
Org	9 16.07%	45 80.36%	2 3.57%	56 100.00%
Total Count **Total Percentage**	**37** **12.33%**	**248** **82.67%**	**15** **5.00%**	**300** **100.00%**

Similar to HTML test, the CSS validation check is carried out and the results showed that 82.67% of web pages failed the CSS test. Just around 1 in 10 web pages categorized under commercial domain passed this test (See Table 4).

6.4 Text versus HTML ratio :

The text versus HTML ratio is used to identify the amount of content and the HTML code used for rendering the content on the webpage. As shown in 5, the info TLD websites (n=6) were found to have more content with an average of 37.78 (SD=32.98), while commercial websites (n=155) averaging 26.37 (SD=17.91), and educational websites (n=57) were found to be having an average of 23.74 (SD=15.07) content compared to the HTML code.

Table 5: Mean and SD of Text/HTML with Respect to Type of URL

Text Versus HTML Ratio			
URL Type	**N**	**Average**	**StdDev**
Com	155	26.37	17.91
Edu	57	23.74	15.07
Gov	23	23.99	11.91
Info	6	37.78	32.98
Net	3	12.67	3.08
Org	56	22.10	14.89
Grand Total	**300**	**24.98**	**16.88**

6.5 Broken links :

Broken links are a sign of not so well-maintained website and are a huge disappoint on user experience. These act as a dead end for the user and also for the search engine crawlers and might affect the ranking of website on SERP. As can be seen in Table 6, overall, an average of 4.86 links is found to be broken among the sampled links. The non-profit organization websites were found to be having an average of 9.88 broken links and the commercial websites with an average of 4.31. A standard deviation of 39.60 (org domain) and 12.21(com domain) indicates that websites vary to a great extent in terms of maintenance of hyperlinks on their websites.

Table 6 : Mean and SD of broken links with respect to type of URL

	Broken Links			
URL Type	**N**	**Sum**	**Average**	**StdDev**
com	155	668	4.31	12.22
edu	57	184	3.23	4.95
gov	23	39	1.70	2.79
info	6	5	0.83	1.33
net	3	10	3.33	4.16
org	56	553	9.88	39.60
Grand Total	**300**	**1459**	**4.86**	**19.42**

6.6 Page Speed :

Many industry researches suggest that the web user prefer web pages which are attractive, mobile friendly, and are quick in loading. Search engine optimization experts suggest that user experience such as page load time and mobile friendly are considered by the search engine for ranking results. Table 7 provides the page speed analysis of websites on mobile devices. It can be observed that the average page speed for commercial websites (n =155)is 43.94 (SD = 29.88), and for non-profit organizational websites (n = 56) the value is 42.16 (SD = 28.70).

Table 7: Mean and SD of page speed mobile with respect to type of URL*

	Page Speed Mobile		
URL Type	**N**	**Mean**	**StdDev**
Com	155	43.94	29.88
Edu	57	38.75	25.47
gov	23	50.61	22.52
info	6	82.83	14.59
net	3	50.67	29.40
org	56	42.16	28.70
Grand Total	**300**	**44.02**	**28.63**

* Milliseconds are converted to a metric score of 0-100. For more information on assessment vitals, please refer the following link; About PageSpeedInsights | Google Developers

6.7 Accelerated mobile page :

The smartphone has enabled the users to search, access, and share information on the go. The mobile Internet usage has seen a tremendous growth in recent years and promises the trend to continue in future with advancement in mobile technology. The AMP not only provides an instant seamless access to web on the mobile, but also saves the data for users on limited data plans. Google continues to support AMP by linking to AMP pages whenever available, and "AMP is not a neutral technology as the search engine favours content that is using Google AMP" (Phokeer et al., 2019).

Table 8 : Type of URL versus AMP

	AMP			
URL Type	**Yes**	**No**	**NA**	**Grand Total**
com	2 1.29%	151 97.42%	2 1.29%	155 100.00%
edu	3 5.26%	52 91.23%	2 3.51%	57 100.00%
gov	0 0.00%	23 100.00%	0 0.00%	23 100.00%
info	0 0.00%	6 100.00%	0 0.00%	6 100.00%
net	0 0.00%	3 100.00%	0 0.00%	3 100.00%
org	3 5.36%	53 94.64%	0 0.00%	56 100.00%
Total Count	**8**	**288**	**4**	**300**
Total Percentage	**2.67%**	**96.00%**	**1.33%**	**100.00%**

Around 96% of websites under study do not have an AMP page and it should be noted that the commercial websites which are usually developed by web developers have not considered to develop dedicated AMP webpages whereby the mobile users can be directed to these pages. Only 3% of commercial websites were found to be having the AMP pages (Table 8).

6.8 Google Analytics :

As shown in Table 9, overall, 72% of websites were found to have a Google Analytics tracking IDs associated with website for analytics. Around 70% of commercial websites, 84.21% of educational websites, and around 6 in 10

non-profit websites were found to be monitored by their web developers.

Table 9: Type of URL Versus Google Analytics

	Google Analytics Availability		
URL Type	**Yes**	**No**	**Grand Total**
com	108 69.68%	47 30.32%	155 100.00%
edu	48 84.21%	9 15.79%	57 100.00%
gov	18 78.26%	5 21.74%	23 100.00%
info	4 66.67%	2 33.33%	6 100.00%
net	1 33.33%	2 66.67%	3 100.00%
org	37 66.07%	19 33.93%	56 100.00%
Total Count	**216**	**84**	**300**
Total Percentage	**72.00%**	**28.00%**	**100.00%**

7. Findings and discussion :

- The metadata description tag used for defining what the web page is about is found to be available in 57.67% of web pages. Around 71% of commercial web pages, 39% of educational and 35% of government web pages were found to have this metadata tags in their source code.
- Across the entire domain categories, there was not a single domain category above 50% to have used any type of schema in their web pages.
- Around 97% of web pages failed the HTML test and 82.67% of web pages failed the CSS test.
- Commercial websites averaged 26.37 (SD=17.91), and educational websites were found to be having an average of 23.74 (SD=15.07) content compared to the HTML code.

- Overall, an average of 4.86 links is found to be broken among the sampled links. A standard deviation of 39.60 (org domain) and 12.21(com domain) indicates that websites vary to a great extent in terms of maintenance of hyperlinks on their websites.
- The average page speed for commercial websites is 43.94 (SD = 29.88), and for non-profit organizational websites the value is 42.16 (SD = 28.70).
- Around 96% of websites under study do not have an AMP page and only 3% of commercial websites were found to be having the AMP pages.
- Overall, 72% of websites were found to have a Google Analytics tracking IDs associated with website for analytics.

8. Conclusion :

Evaluation of a website is applying the individual judgement. The main objective of this paper is to highlight the importance of critical thinking as we have seen in the analysis section that there exist some short comings in the content or the way content is managed on the web. The study was not to categorize the sites as good and bad, but rather to create awareness among the users about the need to evaluate the web content before use. With growing web technologies, new tools are available for the users to evaluate the content and with much ease. It always has the access to right information that helps in making the right judgement and policy decisions.

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