

**COMPARATIVE STUDY OF WEB-BASED SERVICES AND BEST
PRACTICES OFFERED BY TOP UNIVERSITY LIBRARIES IN**

UNIVERSITY LIBRARIES IN INDIA

THESIS SUBMITTED FOR THE AWARD OF THE DEGREE OF THE

DOCTOR OF PHILOSOPHY

IN

LIBRARY AND INFORMATION SCIENCE
FACULTY OF SOCIAL SCIENCE

Submitted by

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Supervisor

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December 2016

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Certificate

This is to certify that, the work presented in this thesis entitled “**COMPARATIVE STUDY OF WEB-BASED SERVICES AND BEST PRACTICES OFFERED BY TOP UNIVERSITY LIBRARIES IN THE WORLD AND “A” GRADE ACCREDITED UNIVERSITY LIBRARIES IN INDIA**” is the own work of **Ms. Sangeeta Namdev Dhamdhere** conducted in the Department of Library and Information Science, RTM University, Nagpur under my supervision. This work has not been submitted earlier to any University / Institution for any research degree to the best of my knowledge.

Dated: / 12/ 2016

Place: NAGPUR

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Declaration

I hereby declare that, the work presented in this thesis entitled “**COMPARATIVE STUDY OF WEB-BASED SERVICES AND BEST PRACTICES OFFERED BY TOP UNIVERSITY LIBRARIES IN THE WORLD AND “A” GRADE ACCREDITED UNIVERSITY LIBRARIES IN INDIA**” was carried out by me under the supervision of **Dr. Ramdas Lihitkar** from July 2012 to December 2016. This work or any part of this work is based on original research and has not been submitted by me to any University / Institution for the award of any diploma or degree.

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Ms. Sangeeta Namdev Dhamdhare

Research Scholar

CONTENTS

Description	Page No.
Title Page	i
Certificate by the Guide	ii
Declaration & Undertaking	iii
Pre-Submission Seminar Certificate by the Head of the Department	iv
Acknowledgement	v-vi
Abbreviations	xv
List of Tables	xvi-xx
List of Graphs	xxi-xxiii
List of Maps	xxiv
List of Screenshots	xxv-xxxi
Chapter 1 INTRODUCTION	1-17
1.1. Introduction	1-3
1.2. Origin of the research problem	3-6
1.3. Review of related literature	6-8
1.4. Research Objectives	9
1.5. Hypothesis	9
1.6. Scope	9-10
1.7. Limitations	10
1.8. Research methodology	11
1.8.1. Sample of the Study	11
1.8.1.1. Universities	11-12
1.8.1.2. Web-based services and best practices	12
Part A: Cluster of web-based services	12-15
1. Bibliographical services	13
2. Patron educational services	13-14
3. Patron communication tools	14
4. Web-based publishing platform for patrons	14-15
Part B: Web-based best practices	15
Part C: Single web page university library	15
1.8.2. Research design	15-16
1.8.2.1. Phase 1	16
1.8.2.2. Phase 2	16

1.8.2.3. Phase 3	16
1.9. Chapter Schemes	16
1.10. References	16-17
Chapter 2 REVIEW OF RELATED LITERATURE AND STUDIES	18-58
2.1. Introduction	18
2.2. Web	18-21
2.3. Use of web in the libraries	21-24
2.4. Library 1.0	24-25
2.5. Library 2.0	25-26
2.6. Library 3.0	26-27
2.7. Library 4.0	27
2.8. Library websites	27-35
2.9. Library web-based services	35-48
2.10. University accreditation and rankings	49-50
2.11. Conclusion	51
2.12. References	51-58
Chapter 3 RESEARCH METHODOLOGY	59-80
3.1. Introduction	59
3.2. Research methods	59
3.3. Sample	
3.3.1. Universities	59-74
3.3.2. Web-based services and best practices	75-78
Part A: Cluster of web-based services	75-78
1. Bibliographical services	76
2. Patron educational services	76-77
3. Patron communication tools	77
4. Web-based publishing platform for patrons	77-78
Part B: Web-based best practices	78
Part C: Single web page university library	78
3.4. Research design	78
3.4.1. Phase 1	
3.4.2. Phase 2	
3.4.3. Phase 3	
3.5. Analysis of data	79-80
3.6. Conclusion	80
3.7. References	80

Chapter 4	WEB-BASED SERVICES AND BEST PRACTICES OFFERED BY UNIVERSITY LIBRARIES: AN OVERVIEW	81-224
4.1.	Introduction	81-82
4.2.	Part A: Web-based services offered by university libraries	82-194
4.2.1.	Web-based bibliographical services	82-110
4.2.1.1.	Web OPAC	84-87
4.2.1.2.	Access to databases	88-90
4.2.1.3.	Federated Search/E-Information Discovery Tools	90-92
4.2.1.4.	Datasets	92-93
4.2.1.5.	Access to Library Archives/Digital Collection / Institutional Repository	94-96
4.2.1.6.	Access to Audio/Visual databases	97-98
4.2.1.7.	Find a library	99-100
4.2.1.8.	Off campus access	100-102
4.2.1.9.	New arrivals	102-104
4.2.1.10.	Inter library loan	104-106
4.2.1.11.	e-document delivery service	106-108
4.2.1.12.	Book recommendations	108-110
4.2.2.	Web-based patron education tools	110-159
4.2.2.1.	News and upcoming events	111-112
4.2.2.2.	Weblog	113-114
4.2.2.3.	WordPress	115-116
4.2.2.4.	Instant chat/messaging	116-117
4.2.2.5.	Ask us	118-119
4.2.2.6.	Research/Subject guides	120-123
4.2.2.7.	Video tutorials	124-125
4.2.2.8.	FAQs	126-127
4.2.2.9.	YouTube	128-130
4.2.2.10.	Service directory	130-132
4.2.2.11.	PPTs/PDFs	132-135
4.2.2.12.	Research tutorials	135-136
4.2.2.13.	Tips to access and use the library	137
4.2.2.14.	Newsletter	137-138
4.2.2.15.	Help guides/user guides	138-140
4.2.2.16.	RSS feeds	140-141
4.2.2.17.	Mobile applications	142-143

4.2.2.18. Live/online sessions	144-145
4.2.2.19. Prezi/Slide share	146-148
4.2.2.20. Audio Tutorials	148-149
4.2.2.21. Location maps/directions	149-151
4.2.2.22. Feedback	151-153
4.2.2.23. Live/Online video library	153-154
4.2.2.24. Library Calendar	154-156
4.2.2.25. Photo gallery	156-158
4.2.2.26. Text instructions	158-159
4.2.3. Web-based patron communication tools	160-179
4.2.3.1. Facebook	160-162
4.2.3.2. Twitter	162-164
4.2.3.3. Email	164-165
4.2.3.4. Tumblr	165-166
4.2.3.5. Stumbleupon	166-167
4.2.3.6. Linkedin	167-168
4.2.3.7. Flickr	169-170
4.2.3.8. Pinterest	171-172
4.2.3.9. iTunes	172-173
4.2.3.10. Instagram	174-175
4.2.3.11. Delicious	176
4.2.3.12. Google+	176-177
4.2.3.13. Foursquare	178
4.2.3.14. Whatsapp	179
4.2.4. Web-based publishing platforms for patrons	180-194
4.2.4.1. Open access initiatives	180-182
4.2.4.2. Platforms to authors and journals	183-185
4.2.4.3. University records management	186-188
4.2.4.4. Anti-plagiarism Software Access/ Help	189-191
4.2.4.5. Citation Tools/Help	191-193
4.2.4.6. Coursework	193-194
4.3. Part B: Web-based best practices offered by university libraries	195-219
4.3.1. Online exhibition	195-196
4.3.2. Virtual library tour	197-200

4.3.3. Wikis	200-202
4.3.4. Interactive Games, Puzzles and Movie/Short Films	202-204
4.3.5. Other best practice	205-219
4.4. Part C: Single web page university libraries	219-221
4.5. Conclusion	221
4.6. References	221-224
Chapter 5 A QUANTITATIVE ANALYSIS OF LIBRARY WEB-BASED SERVICES AND BEST PRACTICES RELATED TO THE UNIVERSITY LIBRARIES CONTEXT	225-308
5.1. Introduction	225-230
5.2. Data analysis of library web-based services	230-299
5.2.1. Data analysis of web-based bibliographical services	231-245
5.2.1.1. Web OPAC	231-232
5.2.1.2. Access to databases	232-233
5.2.1.3. Federated Search/E-Information Discovery Tools	233-234
5.2.1.4. Datasets	234-235
5.2.1.5. Access to Library Archives/Digital Collection/ Institutional Repository	235-236
5.2.1.6. Access to Audio/Visual databases	236-237
5.2.1.7. Find a library	237-238
5.2.1.8. Off campus access	238-239
5.2.1.9. New arrivals	239-240
5.2.1.10. Inter library loan	240-241
5.2.1.11. e-document delivery service	241-242
5.2.1.12. Book recommendations	242-243
5.2.1.13. Data analysis of total web-based bibliographical services	243-245
5.2.2. Data analysis of web-based patron education tools	245-274
5.2.2.1. News	245-246
5.2.2.2. Upcoming events	246-247
5.2.2.3. Weblog	247-248
5.2.2.4. WordPress	248-249
5.2.2.5. Instant chat/messaging	249-250
5.2.2.6. Ask us	250-251
5.2.2.7. Research/Subject guides	251-252
5.2.2.8. Video tutorials	253

5.2.2.9. FAQs	254
5.2.2.10. YouTube	255
5.2.2.11. Service directory	256
5.2.2.12. PPTs/PDFs	257
5.2.2.13. Research tutorials	258
5.2.2.14. Tips to access and use the library	259
5.2.2.15. Newsletter	260
5.2.2.16. Help guides/user guides	261
5.2.2.17. RSS feeds	262
5.2.2.18. Mobile applications	263
5.2.2.19. Live/online sessions	264
5.2.2.20. Prezi/Slide share	265
5.2.2.21. Audio Tutorials	266
5.2.2.22. Location maps/directions	267
5.2.2.23. Feedback	268
5.2.2.24. Live/Online video library	269
5.2.2.25. Library Calendar	270
5.2.2.26. Photo gallery	271
5.2.2.27. Text instructions	272
5.2.2.28. Data analysis of total web-based patron education tools/services	273-274
5.2.3. Data analysis of web-based patron communication tools	274-290
5.2.3.1. Facebook	274-275
5.2.3.2. Twitter	275-276
5.2.3.3. Email	276-277
5.2.3.4. Tumblr	278
5.2.3.5. Stumbleupon	279
5.2.3.6. Linkedin	280
5.2.3.7. Flickr	281
5.2.3.8. Pinterest	282
5.2.3.9. iTunes	283
5.2.3.10. Instagram	284
5.2.3.11. Delicious	285
5.2.3.12. Google+	286
5.2.3.13. Foursquare	287

5.2.3.14. Whatsapp	288
5.2.3.15. Data analysis of total web-based patron communication tools	289-290
5.2.4. Data analysis of web-based publishing platforms for patrons	290-298
5.2.4.1. Open access initiatives	290-291
5.2.4.2. Platforms to authors and journals	292
5.2.4.3. University records management	293
5.2.4.4. Anti-plagiarism Software Access/ Help	294
5.2.4.5. Citation Tools/Help	295
5.2.4.6. Coursework	296
5.2.4.7. Data analysis of total web-based publishing platforms for patrons	297-298
5.2.5. Data analysis of total web-based services	298-299
5.3. Part B: Data analysis of web-based best practices offered by university libraries	300-305
5.3.1. Online exhibition	300-301
5.3.2. Virtual library tour	301
5.3.3. Wikis	302
5.3.4. Interactive Games, Puzzles and Movie/Short Films	303-304
5.3.5. Data analysis of total web-based best practice	304-305
5.4. Part C: Data analysis of single web page university libraries	306
5.5. Data analysis and correlation between world/Indian universities rankings with their library rankings as per web-based services offered by them	307-308
5.6. Conclusion	308
Chapter 6 OBSERVATIONS, FINDINGS, SUGGESTIONS AND CONCLUSION	309-332
6.1. Introduction	309
6.2. Observations and findings	309-323
6.2.1. Web-based services offered by university libraries	309-310
6.2.1.1. Web-based bibliographical services	310-312
6.2.1.2. Web-based patron education tools/services	312-314
6.2.1.3. Web-based patron communication tools	314-317
6.2.1.4. Web-based publishing platforms for patrons	317-319
6.2.1.5. Total web-based library services	319-321
6.2.2. Web-based best practices	321-322

6.2.3. Single web page university libraries	323
6.2.4. Correlation of university and library rankings	323
6.3. Suggestions on web-based services and best practices	324-330
6.3.1. Suggestions for future research	330-331
6.4. Conclusion	331-332
Annexures	333-357
Annexure 1.1	333-347
Annexure 5.1	348-351
Annexure 6.1-6.6	352-357
Research Outputs	358-361
Bibliography	362-364

Abbreviations and Acronyms

API	-	Application Programming Interface
ARL	-	Association of Research Libraries
AUB	-	American University of Beirut
CAS	-	Current Awareness Service
CGPA	-	Cumulative Grade Point Average
CWUR	-	Centre for World University Ranking
FAQs	-	Frequently Asked Questions
HSL	-	Health Science Libraries
HTML	-	Hyper Text Markup Language
HTTP	-	Hypertext Transfer Protocol
ICT	-	Information and Communication Technology
ILL	-	Inter Library Loan
IR	-	Institutional Repository
ISBN	-	International Standard Book Number
ISMN	-	International Standard Music Number
ISSN	-	International Standard Serial Number
JUIT	-	Jaypee University of Information Technology
KU	-	Kesetsart University
LMS	-	Learning Management System
LRC	-	Learning Information Center
NAAC	-	National Assessment and Accreditation Council
OA	-	Open Access
OPAC	-	Online Public Access Catalogue
RSS	-	Rich Site Service
SDI	-	Selective Dissemination of Information
SMS	-	Short Message Service
TISS	-	Tata Institute of Social Sciences
UKZN	-	University of KwaZulu-Natal
UPR	-	Universidad de Puerto
URL	-	Uniform Resource Locator
WWW	-	World Wide Web

List of Tables

Sr. No.	Title	Page No.
1.1	Sample of selected universities	10
2.1	Comparison between Library Vs Web	22-24
3.1	Webometrics Ranking of World University Libraries	62-67
3.2	India NAAC "A" grade university libraries	69-73
5.1	List of sample world university libraries with their ranks	225-227
5.2	List of sample Indian university libraries with their NAAC ranks	228-229
5.3	% (count) of library websites giving web OPAC service	231
5.4	Chi-Square Tests for web OPAC service	232
5.5	% (count) of library websites giving access to database	232
5.6	Chi-Square Tests for Access to Database	233
5.7	% (count) of library websites providing federated Search/information discovery tools	233
5.8	Chi-Square Tests for federated Search/information discovery tools	234
5.9	% (count) of library websites providing access to datasets	234
5.10	Chi-Square Tests for Access to Datasets	235
5.11	% (count) of library websites offering access to archives/ digital collection/ IR	235
5.12	Chi-Square Tests for archives or digital collection or IR	236
5.13	% (count) of library websites providing Access to visual databases	236
5.14	Chi-Square Tests for Access to visual databases	237
5.15	% (count) of library websites providing find a library service	237
5.16	Chi-Square Tests for find a library service	238
5.17	% (count) of library websites providing off campus access	238
5.18	Chi-Square Tests for off campus access service	239
5.19	% (count) of library websites offering new arrival service	239
5.20	Chi-Square Tests for new arrival service	240
5.21	% (count) of library websites offering ILL service	240
5.22	Chi-Square Tests for ILL service	241
5.23	% (count) of library websites offering e-document delivery service	241
5.24	Chi-Square Tests for e-document delivery service	242
5.25	% (count) of library websites offering online book recommendation	242

	service	
5.26	Chi-Square Tests for book recommendation service	243
5.27	Group Statistics for total bibliographical services area wise	243
5.28	Independent Samples Test for total Bibliographical services	245
5.29	% (count) of libraries offering current news service on their website	246
5.30	Chi-Square Test for News	246
5.31	% (count) of library websites offering upcoming events service	247
5.32	Chi-Square Tests for upcoming events	247
5.33	% (count) of libraries having their weblog	248
5.34	Chi-Square Tests for library weblog	248
5.35	% (count) of library websites using WordPress platform	249
5.36	Chi-Square Tests for WordPress	249
5.37	% (count) of library websites offering Instant chat/messaging service	250
5.38	Chi-Square Tests for instant chats/messaging service	250
5.39	% (count) of library websites offering ask us service	251
5.40	Chi-Square Tests for ask us service	251
5.41	% (count) of library websites offering research or subject guide service	252
5.42	Chi-Square Tests for Research/Subject Guide service	252
5.43	% (count) of library websites providing video tutorial service	253
5.44	Chi-Square Tests for video tutorial tools	253
5.45	% (count) of library websites offering FAQ service	254
5.46	Chi-Square Tests for FAQ service	254
5.47	% (count) of library websites use You Tube platform	255
5.48	Chi-Square Tests for You Tube platform	255
5.49	% (count) of libraries providing service directory on their website	256
5.50	Chi-Square Tests for Service Directory	256
5.51	% (count) of library websites using PPTs/PDFs for patron education	257
5.52	Chi-Square Tests for usage of PPTs/PDFs	257
5.53	% (count) of libraries use research tutorials for patron education	258
5.54	Chi-Square Tests for Research Tutorials	258
5.55	% (count) of library websites provides tips for access and use of the library	259
5.56	Chi-Square Tests for Tips for Access and Use	259
5.57	% (count) of libraries publishing their newsletter	260

5.58	Chi-Square Tests for Newsletter	260
5.59	% (count) of library websites publishing help/user Guides	261
5.60	Chi-Square Tests for Help/User Guides	261
5.61	% (count) of library websites offering RSS feeds	262
5.62	Chi-Square Tests for RSS feeds	262
5.63	% (count) of mobile friendly library websites	263
5.64	Chi-Square Tests for mobile application	263
5.65	% (count) of library websites offering live online sessions	264
5.66	Chi-Square Tests for live online sessions	264
5.67	% (count) of libraries educating their patrons using Prezi ppt tool/ Slideshare	265
5.68	Chi-Square Tests for Prezi PPT tool/ Slideshare	265
5.69	% (count) of libraries using the audio tutorial to educate their patrons	266
5.70	Chi-Square Tests for audio tutorials	266
5.71	% (count) of library websites provides maps directions	267
5.72	Chi-Square Tests for map directions	267
5.73	% (count) of library websites collecting library Feedback	268
5.74	Chi-Square Tests for Feedback	268
5.75	% (count) of library websites offering Live/Online video library	269
5.76	Chi-Square Tests for Live/Online Video Library	269
5.77	% (count) of library websites publishing Library Calendar	270
5.78	Chi-Square Tests for library calendar	270
5.79	% (count) of library websites having a column of photo gallery	271
5.80	Chi-Square Tests for photo gallery	271
5.81	% (count) of libraries educating patrons with text instruction on their websites	272
5.82	Chi-Square Tests for Text Instructions	272
5.83	Group Statistics for total patron education services	273
5.84	Independent Samples Test for patron education tools	274
5.85	% (count) of libraries using Facebook for patron communication	275
5.86	Chi-Square Tests for Facebook	275
5.87	% (count) of libraries using Twitter for patron communication	276
5.88	Chi-Square Tests for Twitter	276
5.89	% (count) of libraries using email to communicate with patrons	277
5.90	Chi-Square Tests for Email	277

5.91	% (count) of libraries using Tumblr for patron communication	278
5.92	Chi-Square Tests for Tumblr	278
5.93	% (count) of libraries using Stumbleupon for patron communication	279
5.94	Chi-Square Tests for Stumbleupon	279
5.95	% (count) of libraries using Linkedin to link with patrons	280
5.96	Chi-Square Tests for Linkedin	280
5.97	% (count) of libraries using Flickr to connect with patrons	281
5.98	Chi-Square Tests for Flickr	281
5.99	% (count) of libraries using Pinterest	282
5.100	Chi-Square Tests for Pinterest	282
5.101	% (count) of libraries using iTunes to publish audio files	283
5.102	Chi-Square Tests for iTunes	283
5.103	% (count) of libraries using Instagram for photo sharing	284
5.104	Chi-Square Tests for Instagram	284
5.105	% (count) of libraries using Delicious	285
5.106	Chi-Square Tests for Delicious	285
5.107	% (count) of libraries using Google+ to connect with users	286
5.108	Chi-Square Tests for Google+	286
5.109	% (count) of libraries using Foursquare for patron communication	287
5.110	Chi-Square Tests for Foursquare	287
5.111	Table 5.111: % (count) of libraries using WhatsApp for patron communication	288
5.112	Chi-Square Tests for WhatsApp	288
5.113	Group Statistics for total patron communication services	289
5.114	Independent Samples Test for total patron communication services	290
5.115	% (count) of libraries taking open access initiatives	291
5.116	Chi-Square Tests for Open access initiatives	291
5.117	% (count) of library websites providing platform for authors and journals	292
5.118	Chi-Square Tests for Platform to authors and journals	292
5.119	% (Count) on library websites managing university records	293
5.120	Chi-Square Tests for university records management	293
5.121	% (count) of library websites offering Anti-plagiarism software access/help	294
5.122	Chi-Square Tests for Anti-plagiarism software access/ help	294

5.123	% (count) of library websites providing access to citation tools	295
5.124	Chi-Square Tests for Citation Tools	295
5.125	Table 5.125: % (count) of libraries providing help for coursework	296
5.126	Chi-Square Tests for Coursework	296
5.127	Group Statistics for publishing platform for patrons	297
5.128	Independent Samples Test for publishing platform for patrons	298
5.129	Group Statistics for total web-based services	298
5.130	Independent Samples Test for total web-based services	299
5.131	% (count) of libraries conducting online exhibitions	300
5.132	Chi-Square Tests for online exhibitions	301
5.133	% (count) of library websites providing virtual tour to library	301
5.134	Chi-Square Tests for Virtual Tour	302
5.135	% (count) of libraries having their wiki pages	302
5.136	Chi-Square Tests for Wikis	303
5.137	% (count) of libraries using Interactive games, puzzles and movies/short films	303
5.138	Chi-Square Tests for interactive games, puzzles and movie/ short films	304
5.139	Group Statistics for total web-based best practices	304
5.140	Independent Samples Test for web-based best practices	305
5.141	% (count) of libraries having Single web page	306
5.142	Chi-Square Tests for Single webpage university libraries	306
5.143	Correlations between world/India university and their library rankings.	307-308

List of Graphs

Sr. No.	Title	Page No.
5.1	% score forgiving Web OPAC	231
5.2	% score of Access to Databases	232
5.3	% score of access to federated search/ e-discovery tool	233
5.4	% score of access to datasets	234
5.5	% score for offering archives, digital collection/IR	235
5.6	% score for providing access to visual databases	236
5.7	% score for find a library service	237
5.8	% score for providing off campus access	238
5.9	% score for offering new arrival service	239
5.10	% score for offering ILL service	240
5.11	% score for offering e-document delivery service	241
5.12	% score for offering online book recommendation service	242
5.13	Group statistics for mean of total bibliographical services	244
5.14	% score for offering current awareness service	246
5.15	% score for offering upcoming events service	247
5.16	% score for having weblog	248
5.17	% score for using WordPress platform	249
5.18	% score for offering Instant Chat/messaging service	250
5.19	% score for ask us service	251
5.20	% score for research/subject guide service	252
5.21	% score for video tutorial service	253
5.22	% score for FAQ service	254
5.23	% score for use of YouTube platform	255
5.24	% score for providing service directory	256
5.25	% score for the use of PPTs/PDFs	257
5.26	% score for the use of research tutorials	258
5.27	% score for providing tips for access and use of the library	259
5.28	% score for publishing newsletter	260
5.29	% score for publishing help/user guides	261
5.30	% score for offering RSS feeds	262
5.31	% score for mobile interface for the website	263

5.32	% score for offering live online sessions	264
5.33	% score for using Prezi/ SlideShare	265
5.34	% score for using audio tutorials	266
5.35	% score for providing map directions	267
5.36	% score for online library feedback	268
5.37	% score for offering live/online video library	269
5.38	% score for publishing library calendar	270
5.39	% score for having photo gallery	271
5.40	% score for publishing text instructions	272
5.41	Group statistics of mean of total patron education services	273
5.42	% score for using Facebook	275
5.43	% score for using Twitter	276
5.44	% score for using Email	277
5.45	% score for using Tumblr	278
5.46	% score for using Stumbleupon	279
5.47	% score for having Linkedin account	280
5.48	% score for using Flickr	281
5.49	% score for using Pinterest	282
5.50	% score for using iTunes	283
5.51	% score for using Instagram	284
5.52	% score for using Delicious	285
5.53	% score for using Google+	286
5.54	% score for using Foursquare	287
5.55	% score for using Whatsapp	288
5.56	Group statistics of mean of total patron communication services	289
5.57	% score for taking OAI	291
5.58	% score for providing platform for author and journals	292
5.59	% score for managing university records	293
5.60	% score for offering Anti-plagiarism software access/help	293
5.61	% score for providing access to citation tools	295
5.62	% score for providing help for coursework	296
5.63	Group statistics of mean of total publishing platforms for patrons	297
5.64	Group statistics of mean of total web-based services	299
5.65	% score for conducting online exhibitions	300
5.66	% score for providing virtual library tour	301

5.67	% score for having wiki pages	302
5.68	% score for using Interactive games, puzzles and movies/shortfilms	303
5.69	Group Statistics of mean score of total web-based best practices	305
6.1	Average score of bibliographical services of 'world' and 'Indian' university libraries	311
6.2	Average score of patron education tools/ services of 'world' and 'Indian' university libraries	313
6.3	Average score of patron communication service of 'world' and 'Indian' university libraries	316
6.4	Average score of patron publishing platform and help service of 'world' and 'Indian' university libraries	318
6.5	Average score of different web-based services of sample university libraries	319
6.6	Overview of all services by World and Indian University Libraries	320
6.7	Average score of best practices of 'world' and 'Indian' university libraries	322

List of Maps

Sr. No.	Title	Page No.
3.1	Sample of world universities on the world map	68
3.2	Sample of top universities from India	74

List of Screenshots

Sr. No.	Title	Page No.
4.1	Penn State University library's bibliographical services	84
4.2	Web OPAC of the University of Puerto Rico library	85
4.3	Charles university library's online catalogue	85
4.4	Jagiellonian university library's online catalogue	86
4.5	Union catalogue of Egyptian universities libraries	87
4.6	COBIB.SI union catalogue of Slovenian libraries	87
4.7	American University of Beirut providing access to databases	89
4.8	University of Pretoria providing access to databases	89
4.9	Jagiellonian university library providing access to databases	90
4.10	e-discovery tool of the Jawaharlal Nehru University library	91
4.11	e-discovery tools of the Tsinghua University library	91
4.12	e-discovery tool of the Melbourne university library	92
4.13	Stanford university library's research datasets service	92
4.14	Data lab of the Berkeley library	93
4.15	An archive of the Seoul National University	93
4.16	Digital repository of the University of Nairobi	95
4.17	Film archive of the Hebrew University of Jerusalem	96
4.18	Institutional repository of Tata Institutes of Social Sciences library	96
4.19	Photographic collection of the University of Cape Town	97
4.20	Multimedia collection of the National Taiwan University library	98
4.21	Steven Spielberg Jewish film archive	98
4.22	Quick search of King Abdul Aziz university libraries	99
4.23	Find a library service by Universidad Federal do Rio de Janeiro	100
4.24	Off-campus access service of Devi Ahilya Vishwavidyalaya	101
4.25	Off-campus access service by the Utrecht university library	101
4.26	Off campus access of the Alma Jordan Library	102
4.27	New arrival service on NCSU libraries website	103
4.28	New arrivals online displays of the University of Nairobi library	103
4.29	Monthly new arrivals services by the Tel Aviv University library	104
4.30	ILL service by the Tel Aviv University library	105
4.31	ILL service of the University of Melbourne library	105

4.32	ILL service of the Monash University library	106
4.33	e-document service of the Kasetsart University library	107
4.34	e-document delivery service of NCSU libraries	107
4.35	e-document delivery service of American University of Beirut	108
4.36	Online book recommendation service of Cambridge University	109
4.37	Online book recommendation service of Bodieian Libraries	109
4.38	Online book recommendation service of United Arab Emirates University	110
4.39	News and events service of the Australian National University library	111
4.40	News and events service of the University of Nairobi library	112
4.41	News and events service of Bodleian libraries	112
4.42	The blog of Universidade Federal do Rio Grande do Sul library	114
4.43	The blogs of University College London libraries	114
4.44	Use of WordPress at the Cornell University library	115
4.45	Use of WordPress at Universidad de Puerto Rico library	116
4.46	Instant Chat/message service of the University of Melbourn library	117
4.47	Screenshot 4.47: Instant messaging service at the University of Oxford library	117
4.48	Ask us service by NCSI libraries	118
4.49	The University of Tokyo library's ask us service	118
4.50	Ask us service by the University of Cambridge library	119
4.51	Ask us service by the Melbourne university library	119
4.52	Subject guides service of the Universiti Putra Malaysia library	121
4.53	Research guides of the University of the Witwatersrand Johannesburg	122
4.54	Research/subject guides of the University of Kwazulu Natal libraries	123
4.55	E-books guides of the Helsinki University library	123
4.56	Video tutorials of the Cambridge university library	124
4.57	Video tutorials of the University of West Indies library	125
4.58	The Alma Jordan Library tutorial videos	125
4.59	FAQ service by the North-Eastern Hill University library	126
4.60	FAQ service by the Portail National de Signalement des Theses	127
4.61	FAQ service by the Cambridge University library	127
4.62	The use of YouTube by Helsinki University library	128

4.63	The use of YouTube by the University of Hyderabad library	129
4.64	The use of YouTube by the University of Witwatersrand library	129
4.65	The use of YouTube by the Brender library	130
4.66	Service directory of the Hebrew University of Jerusalem library	131
4.67	Service directory of the University of Kwazulu Natal library	131
4.68	Service directory of the Australian National University library	132
4.69	The use of PDFs at Universidade de São Paulo library	133
4.70	Use of PPTs at Australian National university library	133
4.71	Use of PDFs at Universidad de Puerto Rico Mayaguez library	134
4.72	Use of PPTs at University Putra Malaysia library	134
4.73	Use of PDFs at Universidad de Puerto Rico library	135
4.74	Research tutorials of Cambridge University library	136
4.75	Research tutorial of NCSU library	136
4.76	Newsletter of University of Pretoria library	137
4.77	Newsletter of Tsinghua University library	138
4.78	Manual/help guide of Charles University of Prague library	139
4.79	Library instructions/help guide of the Tel Aviv University library	139
4.80	Library guide of the University of Hyderabad library	140
4.81	RSS feeds of the Cambridge University library	141
4.82	RSS feeds of the American National University library	141
4.83	Mobile interface of Cambridge University library website	142
4.84	Mobile interface for the Australian National University library website	143
4.85	Mobile interface of Universidade de Sao Paulo library website	143
4.86	Online tutorials of University of Cambridge library	144
4.87	Live Chat sessions at the Australian National University library	145
4.88	Live orientation classes at the American University of Beirut library	145
4.89	Use of Prezi at University of Cambridge's Queen Square Library	146
4.90	Use of Prezi at University of Melbourne library	147
4.91	Use of SlideShare at the University of Cape Town library	147
4.92	Use of Prezi at Tsinghua University library	148
4.93	Audio tutorials/recordings at Oxford Bodleian libraries	149
4.94	Location maps of Cambridge University libraries	150
4.95	Library floor map of King Abdulaziz University library	150
4.96	Floor plan of the Cambridge University library	151

4.97	Online feedback of the Tel Aviv University library	152
4.98	Online suggestions of University of Puerto Rico library	152
4.99	Online feedback of Mahidol University Library	153
4.100	Online video library of Kesetsart University library	154
4.101	Library calendar of The American University of Beirut	155
4.102	Library calendar of University of Pretoria	155
4.103	Library Calendar of Helsinki University	156
4.104	Photo gallery of Jawaharlal Nehru University library	157
4.105	Photo gallery of King Abdul Aziz University library	157
4.106	Photo gallery of Kesetsart University library	158
4.107	Instruction (rules and regulations) of University of Nairobi Library	159
4.108	Library instructions on the University of Witwatersrand website	159
4.109	Facebook page of the University of Petroria	161
4.110	Facebook page of the Jagiellonion Library	161
4.111	Facebook page of University of Hyderabad library	162
4.112	Twitter account of the University of New South Wales library	163
4.113	Twitter account of the University of Cambridge library	163
4.114	Tweets of the University of Witwatersrand website	164
4.115	Email service of Tsinghua University library	165
4.116	Tumblr account of the Cambridge University library	166
4.117	Tumblr account of the University of Oxford library	166
4.118	Stumbleupon account of the Cambridge University digital library	167
40119	Linkedin profiles of library staff of University of New South Wales	168
4.120	Linkedin profiles of library professionals of the Australian National University	168
4.121	Flickr account of Cambridge University library	169
4.122	Flickr account of University of Oxford library	170
4.123	Flickr account of the Mahidol University library	170
4.124	Pinterest account of the Cambridge University library	171
4.125	Pinterest account of the Bodleian libraries of Oxford University	172
4.126	Use of iTunes at University of Cape Town library	173
4.127	Use of iTunes for audio files at University College London library	173
4.128	Kasetsart University library on Instagram	174
4.129	Melbourne University library on Instagram	175
4.130	Central Library of Universidade Estadual de Campinas on Instagram	175

4.131	Delicious account of the Oxford University library	176
4.132	Google+ account of Cambridge University library	177
4.133	Google+ account of the Mahidol University library	177
4.134	Foursquare account of the University of Melbourne library	178
4.135	Foursquare account of the Alma Jordan Library of University of West Indies	178
4.136	Use of WhatsApp at Tel Aviv University library	179
4.137	Use of WhatsApp at the Hebrew University of Jerusalem	179
4.138	OAI at Cambridge University library	181
4.139	OAI at University College of London library	181
4.140	OAI at University of Witwatersrand library	182
4.141	OAI at Universiti Putra Malaysia library	182
4.142	NCSU publishes an online magazine Focus for patrons	183
4.143	Zhejiang University library publishes journal of Science	184
4.144	University of Kwazulu Natal library publishes journal Innovation	184
4.145	Universidade Estadual de Campinas library provides platform to publish thesis and dissertations	185
4.146	University of Putra Malaysia publishes journal Pertanika	185
4.147	Seoul National University collection maintained by the library	187
4.148	IR of Universiti Putra Malaysia	187
4.149	NCSU Digital repository managed by the library	188
4.150	Repository of Masaryk University	188
4.151	Plagiarism prevention help at University of Pretoria library	189
4.152	Plagiarism prevention help at University of Melbourne	190
4.153	Access to Turnitin at Monash University library	190
4.154	Access to Turnitin and help at American University of Beirut	191
4.155	Citation help at the Mahidol University library	192
4.156	Citation help at the Melbourne University library	192
4.157	Citations guide at the University of Melbourne	193
4.158	Course work/ reserve service at Taiwan University library	194
4.159	Course support at Shanghai Jiao Tong University library	194
4.160	Online exhibitions at the Australian National University library	195
4.161	Online exhibitions at the University of the West Indies library	196
4.162	Online exhibitions at American University of Beirut library	196
4.163	Virtual (Audio-visual) tour of Harvard University library	197

4.164	Virtual tour of Columbian university library	198
4.165	Virtual tour of Peking University library	198
4.166	Virtual tour of Peking University library	199
4.167	Virtual tour of Mahidol University library	199
4.168	Virtual library tour of King Abdul Aziz University library	200
4.169	Staff wiki of Georgetown University library	201
4.170	Wiki page of Columbia University library	201
4.171	Wiki page of Harvard University library	202
4.172	Online quiz competition at University Sains Malaysia library	203
4.173	Interactive quiz competition at University of Pretoria	203
4.174	Orientation quiz at Melbourne University library	204
4.175	Online quiz at University of Pretoria library	204
4.176	Blackboard at the American University in Cairo library	205
4.177	Use of Moodle courses at Hebrew university of Jerusalem library	206
4.178	Use of Open Courseware at Kyoto University library	206
4.179	Kyoto University display of Borrowed Rankings	207
4.180	Access rankings and new reviews at Kyoto University library	207
4.181	New collection reviews at Kyoto University library	208
4.182	Latest book reviews at Ksinghua University library	208
4.183	Special tools for specific patrons at the American University of Beirut	209
4.184	Archive of Annual lectures organized by Australia National University library	210
4.185	Skills training at Queensland University library	211
4.186	Lynda.com online courses at the University of Queensland library	211
4.187	Green library project at Kesetsart University library	212
4.188	Display of statistics of library services at Kesetsart University	212
4.189	Reading promotion network by Kesetsart University Green Library	213
4.190	Gender wise King Abdul Aziz University libraries	213
4.191	Amazon Associate Program at Tej Aviv University library	214
4.192	Tel Aviv University libraries associate program with Amazon	214
4.193	Plurk patron communication platform by NTU library	215
4.194	Referencing guides by Cambridge University	216
4.195	Referencing guides by University of West Indies	216
4.196	Referencing guides by University of Witwatersrand	217

4.197	e-brochure of Seoul National University library	218
4.198	e-brochure of library services of the University of Pretoria	218
4.199	e-brochure of the American University of Beirut	219
4.200	Web page of Bharati Vidyapeeth library	220
4.201	Webpage of Kakatiya University library	221

Chapter1

INTRODUCTION

CHAPTER 1

INTRODUCTION

The main motto of any library is to give maximum information for maximum number of time by maximum number of ways in minimum time – **Sangeeta Dhamdhare**

1.1. INTRODUCTION

The success of any library is in its innovative services and best practices. Total Quality Management (TQM) stresses upon continuous improvement in services as core values (Vyas, 2009). To cope up with the timely challenges, every library has to identify and develop its own tailor-made best practices to enhance its collection, processes, services, facilities, and use of the library as a whole. Several factors are forcing the academic libraries to change. The drivers of change include social and economic factors along with technological innovations which affect higher education as well as libraries. The main factors behind the change are changes in habits, changes in students, changes in the curriculum, changes in the technological infrastructure and patron's expectations. Open access, e-publishing, automation, digitization, internet, new web and mobile technologies have made an impact on users and slowly the number of users visiting libraries in person is decreasing. In many countries, patrons as well as library staff work from home or on the web with their flexible timetable. More and more virtual communities are emerging in this gigantic field. Therefore, it is a challenge for all libraries to make appropriate planning, think ahead, and work on a detailed analysis of their user needs and the objectives of the institution and future plans towards accepting new technologies in libraries.

Many library stakeholders grumble that any best practice means involvement of a lot of resources, especially in terms of money and equipment. In fact, it requires active participation, willingness, creativity and problem solving attitude from all. Developing best practices, analyzing and revising them at regular intervals will lead to a continuous improvement in overall performance of the library and institution as a whole. Almost all

the services and outputs of a library are associated with these two aspects. These can be strengthened further with the help of additional best practices. That best practice could be innovative and could revolve around philosophy, policy, strategy, program, process or practice that solves a problem or creates new opportunities and positive impact on the whole organization (Best practices in library and information services, 2006). Best practices are nothing but developing tailor-made services, reaching beyond with available resources and delighting the customers (Tikam).

The WWW offers libraries the potential for more revolutionary change as well. The library website has become the main point of access to all library services; it integrates services across libraries, and has become a catalyst for new services. Web Services are self-contained, modular applications that can be described, published, located and invoked over a network, generally on the Web. Web-based library services mean that library users can obtain services whenever they need and scholarly databases can be accessed 24/7 (except for scheduled maintenance and occasional system failures) from anywhere on or off campus. User can check books, journals and make inquiries even when the phones are busy or the library is closed. Patrons can reach out to library staff members via e-mail links when they are not available in the library. Using various educational and web 2.0 technologies, it has become very easy for university library staff to prepare instructional videos, blogs, tutorials, demos, subject guides and reach and educate patrons through various social networks. Many top university libraries are providing most of their services via the web using such technologies.

Many libraries in India are following the practices followed by British Libraries and American Center Libraries operating in India (Vyas, 2009). NAAC is also recommending those practices and services. The libraries in the developed countries are much ahead in providing various innovative services to their users and the same trend is coming up in India but with very slow speed. While working in digital, web and electronic environment, all librarians are very curious to know what they can do to attract new readers and provide prompt service to their users. This doctoral dissertation proposes to

study the library's web-based services, best practices and technology used in modern libraries from all over the world and compares them to Indian libraries.

1.2. ORIGIN OF THE RESEARCH PROBLEM

With the new trends in technology, publishing and users' expectations, libraries need to change a lot. The new trends in libraries are visible already in developed countries like UK, USA and top universities or institutes of these countries. They are already providing better services personally as well as online. Because of the web and new library technologies, it has become very easy for libraries to reach out to patrons and provide them resources at their fingertips wherever they are. As per law of librarianship, library is for all and access to library material should be easy to save the time of the reader. To fulfill this purpose, Open public access catalogue (OPAC), information discovery tools are there. Many developed countries' libraries provide access to their catalogue and electronic resources online for all and on the other hand still many libraries in developing countries keep these accesses limited to their users and are password protected. With emerging online educational technology, libraries are using different tools and application to educate their patrons online by using social networking sites, by preparing blogs, subject guides, video tutorials, audio tutorials, PDF instructions, interactive PPTs, etc. Many innovative ways are accepted in many libraries to attract readers and inculcate reading habits and support research activity like interactive games, quiz, online exhibitions, etc. If we compare these library web-based services, practices and technology; Indian libraries are lagging behind in offering such web-based services because of various reasons like lack of trained staff to manage these kinds of services, websites are outsourced, lack of funds, less knowledge of technologies and tools used behind such service but Indian university libraries can see the way ahead.

The web is the main tool for scholarly communication now a days. The web is accessible from all over the world and reaches every country. It can reflect all missions of university libraries to make a vibrant learning unit of the university. It provides easy access to relevant indicators. The global ranking of universities is also depending on how these universities are represented on the web. According to 'Webometric Ranking of

Universities', the university or the institutional websites should accurately represent their resources, activities, global performance and provide visitors a clearer vision of the university or institution. They intend to motivate both the institutions and the scholars to have a web presence that reflect accurately their activities. They suggested that if the web performance of an institution is below the expected position according to their academic excellence, university authorities should reconsider their web policy, promoting substantial increases of the volume and the quality of their electronic publications (About us). Here the university libraries can play a major role to improve university ranking.

It has been observed that, in 'QS World University Rankings' or 'Times Higher Education World University Ranking', the top Indian universities failed to make a mark. There are many reasons for that as the Indian universities do not document their systems, processes and outputs and so unable to produce this data when asked by the ranking agency. Another reason is the universities do not have the number of research papers produced and the number of citations those papers received to the international faculty and international student ratio. The 'Times Higher Education Ranking' places emphasis on citations per faculty member for their research work.

So, according to the investigator, to improve this situation being the heart of the universities, the university libraries in India should take lead role in promoting the web-based services, open access, online bibliographical services, research support and training along with online education and communication. Along with the library services on the web, there is the need to transform the library users into the precious researchers. Many university libraries give access to OPAC, institutional repository and electronic resources online, but still the use of all these resources in universities is low. The main reason behind this is that the student number strength is very high in universities. In many universities there is no fixed schedule to give information literacy programs and orientation classes for all staff and students. Every year all universities organize such sessions, but only interested and present staff and students attend such classes. Remaining students and staff remain unaware about library services and facilities. The common traditional lecture and orientation model of teaching does not lead to achieve the desired outcome. Patron-centric strategy like flipped the classroom using e-learning method is an

extremely useful alternate learning model in this digital environment and therefore study is being carried out to study web-based patron education tools, communication tools and research promotion tools by top world university libraries and give suggestions to Indian university libraries to maximize use of these tools and services.

In the review of literature of earlier research on library websites and web based services it has been observed that many researchers emphasized on application of web 2.0 tools in university libraries. Hardly 15 web 2.0 tools were studied and other studies were in the usability of library websites. Not a single research has covered university libraries from all parts of the world. Therefore in this study, the investigator has tried to search and shortlist the web based services offered by the top world university libraries and the Indian university libraries including web-based bibliographical services, web-based patron education tools to educate patron, web-based patron communication tools, web-based research support, publishing support and best practices offered by selecting 70 traditional university libraries spread equally all over the world and 39 NAAC⁸ “A” Grade traditional university libraries of India. Inventory of university library web based services and best practices are prepared and divided into following three parts web-based library services, web-based best practices and single web page university libraries. In the first part total 59 web-based library services are divided into four clusters, namely 12 bibliographical services, 27 patron education services, 14 patron communication web tools, 6 web-based publishing platform for patrons. The second part is dedicated to best practices. In this main 4 best practices are shortlisted from all 109 sample libraries and about 11 other best practices are mentioned in other best practices. In the third part, the libraries having a single webpage are studied. Total 63 web based services and practices are shortlisted. From the results and findings of this study, the libraries in India, developing countries and under developed countries will get more ideas to improve and give the best services to future digital generation users and improve their university ranking at global level. The main feature of undertaking this research is to study top world university libraries from all areas of the world and not limited to specific countries.

Earlier studies were related to the comparative study of websites or library web-based services (web 2.0 tools) offered by university libraries between two or more countries.

1.3. REVIEW OF RELATED LITERATURE

To select the topic and the objectives of this research, the investigator reviewed many previously published research articles, books, thesis, other scholarly publications and websites on related topic since 1998 to recent 2016. In the chapter 2 “Review of Related Literature and Studies” it has been discussed in detail. To search related work Google Scholar, INFLIBNET N-List Consortia, DOAJ Directory, Sage Journals, Elsevier Journals, academia.edu, Indian Journal.com and Shodh Ganga, etc. platforms were used along with the printed books available in the library.

The investigator began this chapter with the concept of World Wide Web, Internet, on how these technologies were invented, beginning of use of web and integrating library websites as part of their daily functioning in university libraries followed by the studies done related to university library websites and web-based services in previous years is discussed in detail. All previous studies related to the library website and library web-based services offered by university libraries are arranged chronologically.

Initially with definitions and description of WWW, internet, Web 1.0 to Web 4.0 distinctions between library and web given on Virginia Tech University Libraries website (Virginia Tech University Library) along with the advantages and disadvantages of visiting libraries and web is discussed. How Norozi, Alireza (2004) applied Ranganathan’s five laws of librarianship to the web and web resources as web resources are for use, every user his or her web resource, every web resource its user, save the time of the user, the web is a growing organism is discussed. The library reform of the early 20th century was based on a set of values, where the patron should have the best possible access to and the best possible benefit of library resources, all built on democratic values. Then the progress of Library 1.0 to Library 4.0 services is discussed in brief using different references.

Investigator observed that, since 1998 large number of studies carried out on the university library website. In review of literature chapter many of the articles and research done on university library websites since 1998 to 2015 are covered. All articles and research finding are arranged chronologically. The research on library websites was initiated by studying and comparing university library web pages and analyze for resources and information given on library web pages by (Riddle, 1998) and (Cohen & Still, 1999). The year 2000 onwards researchers were studying on design, contents of university library websites, usability, factors affecting users' intentions to use library website and services and also outlined conceptual model for the university library website.

The investigator has reviewed specific literature published on study conducted on web-based services offered by university libraries since 1999 and arranged chronologically. It has been found that, many studies and research were conducted in which web 2.0 tools are being used in university libraries at various levels. Application of not more than fifteen web 2.0 tools were studied earlier and the main focus was given to study use of social networks or media in university libraries. Studies on how university libraries from specific university or region or countries took web 2.0 tools to provide web-based services and what more they can do, factor affecting while implementing these services is being discussed. Few studies were to comparative study of the use of web 2.0 tools between two or more than two countries. No study has been done yet to study university library web-based services offered by universities in all parts of the world. This is unique feature of this study that, in this study investigator studies top 5 university libraries from each region along with top 5 world university libraries and covered not only web 2.0 services, but other web-based services like bibliographical services, patron education tools, patron communication tools (moreover like web 2.0), web-based publishing platform to patrons, web-based best practices offered by university libraries and a single static web page university library. Total 109 university libraries are studied out of which 70 from the world and 39 from India

When we see today's library websites from different countries, we observe that website is used to give user centered services. Libraries use many web tools, softwares (automation, digital, content management, etc.), interactive tools, survey tools, chat tools, mobile access, OPACs for print, non-print material, etc. So, from this point of view, there is still need to assimilate the knowledge about various websites from academics, research and corporate to know innovative web-based services, practices and tools they are using which will benefit other underdeveloped libraries to build their website.

From all earlier studies and research discussed, investigator observed that most of the studies carried out till date are related to web 2.0 applications in the libraries forgetting basic fundamental library services on the web like bibliographical services, patron education services, communication services, research services, publication services, etc. and new innovative practices. There is need to apply new web-based services, but at the same time there is a need to improve basic fundamental library services using new technologies. Considering these issues investigator prepared inventory of maximum services visiting various top university libraries from all over the world to help Indian libraries or developing country libraries to improve their online services to their patron. In the chapter 4, the investigators gave an overview of all the web-based services and best practices to give a clear idea about these services and how university libraries are offering these services. Unlike other previous studies in this study both English and Non-English university library websites are studied.

1.4. RESEARCH OBJECTIVES

The basic aim of the study is to find web-based services and practices followed by top university libraries at international level and not to evaluate university library websites, their design or usability or the popularity of their contents and services studied earlier.

- To know the current status of library services of universities in the world and India.
- To identify and analyze the web based library services, best practices and technology used by them.
- To promote web presence and web-based services in Indian university libraries
- To correlate the rankings of the world and Indian university with their library rankings
- To compare the parameters of NAAC and other bodies of accreditation and ranking and identify the areas to improve on in Indian libraries.
- Suggest the best practices to be followed by Indian university libraries to change their profiles into more modern information centers with higher education potential.

1.5. HYPOTHESIS

- Services offered by university libraries on their websites reflect the overall quality of the institution both as a cause and a consequence;
- Indian university libraries score much lower than top world universities in this respect;
- By improving the library web-based services also the general development status of universities and education in India will improve.

1.6. SCOPE

The scope of the study is an international group of the selected university libraries from all parts of the world on the one hand and from India on the other hand for their web-based services and best practices. The investigator has selected 70 top traditional

universities out of 11999 of the world recorded in the year 2014 available on ‘www.webometrics.com’ site and 39 A-grade accredited universities by the NAAC in India in 2014 valid from 2008 to 2016 with CGPA Score more than 3.0 for a study of their web-based services, best practices and technology. Below table 1.1 shows the sample size of universities selected.

Table 1.1: Sample of selected universities

Universities	Total	Sample Selected
Top World Ranked	11999	70
“A” Grade Accredited by NAAC –India(Valid)	53	39
Total	12052	109

1.7. LIMITATIONS:

This study will be limited to the top 70 traditional universities of the world as per ‘Webometric Rankings of Universities’ 2014 on the one hand, and 39 higher CGPA (above 3.0) ranked NAAC “A” grade university libraries in India.

The findings and results are based on the information available on the web, i.e. library websites, blogs, Google and web 2.0 application accounts/logins of selected university libraries only. Individual library staff’s social network account is not considered for this study. The services offered on intranet or within the campus not covered in this research unless they provided their existence or information on their library website or Google. The study is limited to, web-based bibliographic services, web-based patron education tools, patron communication tools and web-based publishing platform for patrons. The services studied quantitatively not qualitatively.

1.8. RESEARCH METHODOLOGY

Survey Method for Indian university libraries and world university libraries by surfing a library website, blog, Google and social network accounts will be followed.

This research from a methodological point of view contains the following elements:

- Identification of a proper subset of libraries from the Globe and India
- Creation of a list of web-based services and best practices from what could be found on the library website/blog.
- Producing an inventory of these services by checking them on each of the library websites of selected universities and Google platform.
- Analysis of web-based bibliographic services, patron education practices, patron communication tools, web-based publishing platform for patrons through web.
- Comparing the results for top world university libraries from different areas and Indian university library web-services.

1.8.1 SAMPLE OF THE STUDY

1.8.1.1. UNIVERSITIES

For this study the universities sample was collected from the 'Ranking Web of Universities' and 'National Assessment and Accreditation Council' (NAAC) India. For rating the world universities '**Webometrics Ranking of World Universities**' which is a largest academic ranking of higher education institutions and an initiative of the '**CybermetricsLab**' (Spanish National Research Council, CSIC) were selected as it is a ranking of not only a few hundred institutions from the developed world but all the universities of the world (Ranking web of universities).

Total 70 traditional universities out of 11999 world's best university rankings, based on 'Webometrics Ranking of World Universities', were selected from various areas of the world including World, Brics, Civet, Latin America, Caribbean, Asia/Pacifico, Middle East, South East Asia, Oceania, Europe, Central Eastern Europe, Africa, North Africa and Arab World. With this selection investigator covered all the top university libraries in the

World, Brics Civet, Asia, Oceania, Europe, Africa and Arab World first and then from the regions they covered. The repeated universities of the world, Brics, and Civet are excluded from other region's universities. For each area 5 top traditional university libraries are selected for getting a global view of web-based services offered by these university libraries.

To select sample top university libraries of India investigator used ranking given to the Indian universities by NAAC, which is an autonomous body appointed by the University Grants Commission (UGC). Total 39 university libraries out of 53 accredited as “A” Grade by the NAAC valid from 2009 to 2016 were selected for this study. The criteria to select the university libraries used were, according to CGPA score given by NAAC. The traditional universities scoring above 3.0 CGPA were selected and listed state wise (NAAC). The detailed lists of ‘world’ and ‘Indian’ universities are given in the third chapter of “Research Methodology”. In the Annexure 1.1 the list of all selected list of universities along with their rankings, addresses, year of establishments and websites is given.

1.8.1.2. WEB-BASED SERVICES AND BEST PRACTICES

In this study the web-based services and best practices offered by the top selected ‘world’ university libraries and ‘Indian’ university libraries are divided into three parts as below

PART A: Cluster of web-based services: In this part the web-based services offered by sample university libraries are categorized into four different clusters namely

1. Bibliographical services
2. Patron education tools/services
3. Patron communication tools/services and
4. Web-based publishing platform for patrons

The inventory of library web-based services offered by all 109 selected university libraries prepared by the investigator to carry out this study is given here. The overview of all these services is given in the fourth chapter.

1. Bibliographical services:

- Datasets
- Access to Databases
- FederatedSearch/E-Information Discovery Tools
- Web OPAC
- Find a Library
- Archives /Digital Collection/IR
- Visual Database
- Off campus access
- New arrivals
- ILL
- e-document Delivery
- Book Recommendations

2. Patron education tools/services:

- News
- Upcoming Events
- Weblog
- WordPress
- Instant Chat/messaging
- Ask Us
- Research/Subject guides
- Video Tutorials
- FAQs
- YouTube
- Service Directory
- PPTs/PDFs
- Research Tutorials
- Tips for access and use
- Newsletter

- Help/User guides
- RSS Feeds
- Mobile App
- Live/Online Sessions
- Prezi(PPT tool)/slideshare
- Audio Tutorials
- Maps Directions
- Feedback
- Live/online Videos Library
- Library Calendar
- Photo Gallery
- Text Instruction

3. Patron communication tools/services:

- Facebook
- Twitter
- Email
- Tumblr
- Stumbleupon
- Linked in
- Flickr
- Pinterest
- iTunes
- Instagram
- Delicious
- Google+
- Foursquare
- Whatsapp

4. Web-based publishing platform for patrons:

- Open Access Initiatives

- Platform to authors and journals
- University Records Management
- Antiplagiarism Software access/Plagiarism help
- Citation Tools
- Coursework

PART B: Web-based Best Practices

- Online Exhibitions
- Virtual Tour
- Wikis
- Interactive games, puzzles and movie/short films
- Other best practices

PART C: Single web page university library

The details of all web-based services, best practices and single web page university libraries is given in fourth chapter along with examples and screenshots from the universities offering them.

1.8.2. RESEARCH DESIGN

1.8.2.1. Phase 1

- Review of literature for previous study was done on related topics
- Selection of libraries where study has been conducted.
- Inventory of library web based services, best practices and technology used in top universities in the World and India.

1.8.2.2. Phase 2

- Data collection by browsing each and every selected university library website, portal, blog, online service provider's account, Google etc.

1.8.2.3 Phase 3

- Analysis and Comparison of the collected data
- Finding of new web-based services and best practices

- Recommending new web-based services and practices for future Indian university libraries.

1.9. CHAPTER SCHEMES

Chapter – 1 Introduction

Chapter - 2 Review of Literature

Chapter -3 Research Methodology

Chapter - 4 Web-based services and best practices in university libraries: an overview

Chapter - 5 A quantitative analysis of library web-services related to the university library context

Chapter - 6 Observational, Findings, Suggestions and Conclusion

Appendixes

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Chapter2

**REVIEW OF RELATED
LITERATURE AND STUDIES**

CHAPTER 2

REVIEW OF RELATED LITERATURE AND STUDIES

2.1. INTRODUCTION:

This chapter includes ideas, findings, conclusions and suggestions of earlier studies and researchers and gives maximum inputs to the investigator to frame the research study of the chosen topic. Investigator collected maximum information related to the topic from journal articles, books, thesis and other scholarly publications and websites.

2.2. WEB:

The Web is a synonymous term of the ‘World Wide Web’ or the Internet. But as per Vangie Beal the term WWW and internet are not synonymous(Beal). They are separate but related things. The internet is a massive network of networks and it connects millions of computers together globally by forming a network in which any two computers can communicate with each other as long as they are a part of that network. According to Wikipedia “it is a hypertext and hyperlink system that operates over the Internet.”Web, is a way of accessing information over the medium of the Internet. It is an information-sharing model that is built on top of the Internet (Web). The World Wide Web was invented in the year 1989 by a British computer scientist Sir Timothy John “Tim” Berners-Lee, who was working at CERN (The European Organization for Nuclear Research) in Geneva, Switzerland. He wrote the world’s first web client and server. As of now he is playing an active role in maintaining standards for the web and to refine its design as a director of the World Wide Web Consortium (W3C)(10 people who changed the internet forever, 2013). In recent years he has advocated his vision of a semantic web. The WWW is more and more used for application to application communication (Naik & Shivalingaiah, 2008) and publishing arm of internet. It is basically a system of the internet servers that support formatted documents.

The Web uses the Hypertext Transfer Protocol (HTTP) protocol, which is only one of the languages spoken over the Internet to transmit data. The programmatic interfaces made available are referred as web services. A web service is a software system designed to support computer-to-computer interaction over the Internet and taking form of an Application Programming Interface (API)(Naik & Shivalingaiah, 2008). Web services, which use HTTP to allow applications to communicate in order to exchange business logic, use the Web to share information. The Web also utilizes browsers like Internet Explorer or Firefox or Mozilla to access Web documents called Web pages that is linked to each other via hyperlinks. The documents are formatted in a markup language called HTML that supports links to other documents as well as pictures, audios and video files. One can jump from one document to another simply by clicking on the link (hot spots). Not all internet servers are part of World Wide Web(Beal). The web is an increasingly important resource in many aspects of life: education, employment, government, commerce, health care, recreation, and more.

Web 1.0 is the first generation of internet technology since 1996. A small number of writers created web pages for a large number of readers. People could get information by going directly to the source (Getting, 2008). Using this we can call up pages of text and pictures with incredible speed and facility. Web 1.0 was somewhat mono-directional, static and read only web which allowed us to search information and read it (Aghael, Nematbakhsh, & Farsani, 2012). There was very less possibility of user interaction and content contribution. There was no difference from strolling through a library quickly. We could look at the pages on the screen just as we looked at the pages in a book. The main goal of the website was to publish the information for anyone at any time and establish an online presence. The websites were not interactive at all. Core protocols of web 1.0 were HTTP, HTML and URL.

Web 2.0 is the second generation of internet technology which allows for user generated content. The term web 2.0 was used since about October 2004 by Dale Daugherty. In 2004 Tim O'Reilly defined "Web 2.0 is the business revolution in the computer industry

caused by the move to the internet as a platform, and an attempt to understand the rules for success on that new platform". It is known as wisdom web, people-centric web, participative web and read-write web. Along with looking at pages, we can alter them. We can write our own blog, comment on someone else's article in comment boxes, edit an entry on Wikipedia, and share our thoughts on social networking sites. It is a web where users have more interaction and less control. Through this flexible web design, creative reuse, updates, collaborative content creation and modification were facilitated. It supports collaboration and helps us gather collective intelligence rather web 1.0 (Bao, 2000) (Aghael, Nematbakhsh, & Farsani, 2012). If Web 1.0 is like a digital library, Web 2.0 is like a digital 'Letter to the Editor', a digital conference call, a digital group discussion. Web 2.0 is a term applied to a perceived ongoing transition of the World Wide Web from a collection of websites to a full-fledged computing platform serving web applications to end users. Some of the web 2.0 services and technologies are blogging, calendars, chats, collaboration, communication, community, CRM, e-commerce, e-learning, e-mail, file sharing, forums, games, images, knowledge base, lists, mapping, Mashups, multi-media, portals, RSS, wiki, shared pictures (Flickr), videos (YouTube), news/podcasts (Digg, iTunes), knowledge, bookmarks (Delicious), projects (Google Docs), you (Facebook, Myspace), library (Library Thing) and virtual library (Second Life),etc (Web 2.0).

Web 3.0 is where the web is now going 2016 onwards. In Web 3.0, the new media become an essential part of the world in which we are living which help to create the world and we live within them. Web 3.0 is partly about Web 2.0 becoming all pervasive and continuous, so that your connections with the web and your social network is an essential part of every experience – it doesn't get switched off. It is the evolution of web usage and interaction that includes transforming the web into a database. Web 3.0 is defined as the creation of high-quality content and services produced by gifted individuals using web 2.0 technologies as an enabling platform. The Web 3.0 would be something akin to a "read-write-execute" web. It is where the concept of the website or evolution of web usage and interaction along with transforming the web into a database, making content accessible by multiple non-browser applications, the leveraging of

artificial intelligence technologies (Zeldman, 2006). Web 3.0 is built on semantic web technologies, which allows data to be shared and reused across application, enterprise and community boundaries. The main components that constitute Web 3.0 are the 3D web, the semantic web, web ontology and the real world web (Warrier, Shivarama, & Angadi, 2015).

According to Singh, Bebi & Gulati (2011), web 1.0 was about connecting information and getting on the net. Web 2.0 is about connecting people putting the “I” in user interface, and the “we” into a web of social participation. The next stage, web 3.0, is about representing meanings, connecting knowledge, and putting them to work in ways that make our experience of internet more relevant, useful, and enjoyable.

“Some people say Web 4.0 is the Semantic Web when various programs, machines, and the web itself becomes ‘intelligent’, and starts to create new meanings that were not programmed into it, and interact with us in ways that were not predicted or predictable beforehand. It doesn’t actually require any strict definition of ‘artificial intelligence’ or ‘consciousness’ for the computers; it just means that they start doing new things themselves – whatever the philosophers judge is or is not going on in their ‘minds’. This is when the virtual world becomes physically/biologically a part of us, or when we become physically/biologically part of the virtual world. When, in other words, the data is not communicated by phones or earpieces or glasses, but is implanted in us, so that the virtual data is part of our consciousness directly, and not just part of our visual or aural experience and/or, when we control the real and virtual world with some kind of brain or neural interface, so that – in both cases – there really is a seamless integration of the real and the virtual, the personal/biological and the digital.” (Wang, 2012)

2.3. USE OF WEB IN THE LIBRARIES:

Information and communication technology (ICT), internet and web technology have dramatically impacted the publishing, research and library world in the last few years and

this trend continues going well into the future. Information exchange and information distribution have transformed in disparate formats and by dynamic channels. Many libraries have discovered the advantages of having a presence on the internet and have successfully addressed their objectives by integrating their web site as part of their daily functioning (Mehta & Trivedi, 2015). In library field, the development of a library website was initiated from 1990. When the world's first web browser Mosaic was released in 1993, Health Science Libraries took the initiative to develop library websites. The 21st century libraries, demand of library automation, networking and developing digital collections. Patrons need access to digital collections like online databases, e-books, e-journals, multimedia collections from their home. In web 2.0 environment web pages are evolved as blogs, encyclopedias into Wikipedia, and text tutorials into streaming media applications, email to instant chat or messaging and so on. (Rath & Rath)

On Virginia Tech University Libraries website the comparison between library Vs web are given in the below table.

Table 2.1. Comparison between Library Vs Web

Components	Starting with the Libraries	Starting with the Web
Review of Resources	Library resources go through a review process and therefore the library resources are reliable, historically relevant, and valuable.	Most information on the web does not go through a review process as everyone has the freedom to publish on the web without passing the content through an editor. Pages might be written by an expert on the topic, a journalist, and a disgruntled consumer or a sixth grader.
Access to resources	Library resources are free for patron's use	Some information on the web is not free

Organization of Resources	Library resources are classified and organized in the libraries and patrons can locate the item with call no.	Information on the web is searchable and not comprehensive but not organized. Information can be found by using a search engine such as Google or Bing. Most information on the web is not comprehensive
Nature of Resources	Library resources are meant to be kept permanently. Current and historical information can be found in the library	Most information on the web is not permanent. Some well-maintained sites are updated with very current information, but other sites may become quickly outdated or disappear altogether without much notice.
Assistance in locating resources	Library resources come with personal assistance. Library staff is trained to assist you in searching and locating information resources.	The information you find on the web is as varied as the people who put it there. On the web Libraries, universities, government agencies, companies, organizations and people from all over the world publish information and Internet preliminary assist you to search information through web crawlers.
Quality and Quantity	The key idea when using the library is that you are getting QUALITY over	The key idea when using the web is that you get QUANTITY over QUALITY. The web is a good tool for finding

	QUANTITY.	information, but it is usually not the best place to begin academic research.
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Though we are making distinctions between library and web but these two are not different things. It's important to understand that there is a middle-ground—the idea of the library on the Web. That is to explain, many libraries have web sites which organize information and provide access to collections of quality resources and library services. Libraries on the web are evaluating, organizing Information available online and sometimes digitizing their collections for the use of patrons around the world to use. Norozi (2004) stated five laws of web on the basis of Ranganathan’s five laws as web resources are for use. Every user his or her web resource, every web resource its user, save the time of the user, the web is a growing organism. Academic Libraries are driven by most of the young generation users, they are frequently visiting net and they grow up with the internet. Due to the impact of social networking software (SNS) most of them have profiles on the Internet in different social networking sites and therefore the need to introduce such tools in libraries rise to provide library services (Dora & Maharana, 2008).

Library Web sites often have information about library hours, policies, and contact information if you need assistance. If you are a student at a university, you can use the library online 24 hours a day, seven days a week from any Internet-connected computer. (<http://www.lib.vt.edu/help/research/library-web.html>). Website helps to establish a presence and become an active member of this new and growing cyber-culture, to develop lines of communication with patrons and libraries, to provide information about the library and its services to patrons, to provide remote access to library resources with download facility.

2.4. LIBRARY 1.0: The library reform of the early 20th century was based on a set of values, where the patron should have the best possible access to the library and the best possible benefit of library resources, all built on democratic values. Curran, Murray & Christian (2007) defined Library 1.0 the way resources are kept on shelves or on a

computer behind a login. These resources can be taken from a shelf, checked out to the librarian, taken home for a certain length of time and absorbed, and then taken back to the library for someone else to use. Library 1.0 is a one directional service that takes people to the information that they require.

2.5. LIBRARY 2.0: The term Library 2.0 was first coined by Michael Casey in his blog Library Crunch in September 2005(Chad & Miller, 2005). Web 2.0 transferred into the library world as Library 2.0. It is a read-write library that gives library users' power to decide the service that they get. The basic idea of Library 2.0 is to transform library service by making it more personalized, more interactive, collaborative, more web-based, driven by community needs. It replaced traditional directional library service to more interactive, collaborative and with application of web 2.0 technologies as a Library 2.0. According to Wikipedia, "Library 2.0 is a loosely defined model of library services that reflects a transition within the library world in the way that services are delivered to users". Maness (2006) defines Library 2.0 as "The application of interactive, collaborative and multimedia web based technologies to web based library services and collection. Library 2.0 aims to take the information to the users by bringing library services to the internet and getting the users more involved to improve the services by encouraging them to participate in giving feedback. The essential elements of Library 2.0 are its user-centered participation in content creation and services. It provides multimedia experience and contains audio and video components as well. It's a "social reach"rather communication between library staff and users. It provides community service orientation where not just the librarian participates but the entire user community changes the library services. The library 2.0 services include synchronous messaging, stream media, blogs, wikis, social networks, tagging, RSS feeds, podcasting, mashups, etc.(Rath & Rath).

Library 2.0 services providing new means of information delivery, distribution and manipulation. For example, library OPAC can link to the website, and in social networking space (e.g. Myspace or Facebook) with creating an account and providing a search box on that social space, so that it will be available everywhere, and the user will

be happy to search the OPAC from his favorite social software like Myspace, Facebook and Orkut. On the other side, library also benefits taking advantage of these services, putting the library in the users' space. Library OPAC is only one example of pushing out the services from conventional library zone to the user comfort zone. There are a lot of innovative services, library can provide only library has to bend towards its old services, examine holistically, these fundamental services and try to renovate it into 2.0 formats (Dora & Maharana, 2008).

The difference between Library 1.0 and 2.0: Library 1.0 is in the library only whereas Library 2.0 is everywhere in the world with internet. In Library 1.0, information is controlled by the library and in Library 2.0; information is controlled by user/stakeholder. In Library 1.0, library website is static whereas in Library 2.0, library website is dynamic and interactive. Library 1.0 is publishing platform whereas Library 2.0 is participating platform. Library 1.0 is available locally and library 2.0 available worldwide. Library 1.0 is one way and Library 2.0 is two ways. Library 1.0 is a service and Library 2.0 is an experience.

2.6. LIBRARY 3.0: Lib 3.0 is a product of Web 3.0. Web 3.0 has brought about a revolutionary change in the way we understand the web. Warriar, Shivarama & Angadi(2015) the Web 3.0 technologies like semantic web, web ontology and the real world web have a significant role to play in providing library and information services. The maximization of these services will depend upon how well the services are being executed and how much they are being accepted by the users. In the context of Web 3.0, Crawford & Gorman have re-interpreted Ranganathan's Laws of Library Science (Ranganathan's laws of library science). The role of the information professional in the present scenario goes hand in hand with the third law which states: "Use technology intelligently to enhance the service" and fourth law "protects free access to knowledge". Accordingly, by using various web 3.0 technologies, the library professional will be able to necessarily provide the information as per the requirements of the target users. Library 3.0 projects librarians as prominent apomediaries guiding library users on how best to

locate, access and use credible information in myriad formats from diverse sources, at the point of need. The Library 3.0 model has revived hope amongst those who were uncomfortable with the crowd intelligence architecture on which the Library 2.0 model was founded. It provides the tools and framework to organize the info sphere that the Library 2.0 threw into disarray. The authors see the 3.0 library as a personalizable, intelligent, sensitive living institution created and sustained by a seamless engagement of library users, librarians and subject experts on a federated network of information pathways (Kwanya, Stilwell, & Underwood, 2007).

2.7. LIBRARY 4.0: Younghee (2015) now a days discussions on Web 4.0 and Library 4.0 have begun but very less is written on this. Web 4.0 features commonly suggested by previous researchers are: reading, writing, and executing simultaneously, intelligence-based agents, connected web, ubiquitous web, intelligence connections, massive data, augmented reality, context aware, cutting-edge displays, and infinite creative space and the intelligence-based web.

The web has become commonplace throughout the world, a natural complement to traditional library services and develops innovative ways to meet the information needs of users. Traditional online services have transformed into web based services using web technologies.

2.8. LIBRARY WEBSITES:

A very large number of studies have been carried out on library websites and web based services offered by various libraries all over the world since 1998. A few examples are cited below:

The library website study has started in 20th century itself by the library professionals as libraries are actively involved in creating the library webpage since then. University websites began as a piecemeal project with varying degrees of complexity in early 1990s. Web site standards have developed since 1990s. Initially they started as informational

sites and then became a vital part of post secondary institutions and one of their most visible faces. On the university website library, web pages are the most visited ones. Thus to design a well designed library page can play a crucial role for the University (Peterson, 2006).

A library website is a virtual public face, the quasi equivalent of the front door, signage, path finders, surrogates to the collection, services and it is used as a window to the World Wide Web (Diaz, 1998). Riddle (1998) conducted a comparison of university main pages, not specific libraries. Riddle found that in a survey of twenty-two major university pages, search forms were included only on seven sites and site maps in eight.

A paper by Cohen & Still (1999) offered a fairly detailed analysis of websites of research university libraries and 2-year college libraries. They analyzed 100 websites for specific kinds of resources and information and noted some links from the home page, although they did not analyze other forms of navigation. Categories of surveyed resources included general library information, reference, research, instruction, and functionalities such as search or web-based forms. Their conclusions listed a series of elements that they considered core to any academic website. Many of these elements were linked to specific resources, including the library's online public access catalog (OPAC), Internet subject guides, search engines, subscription databases, and electronic journal services. As per his study, he found that patrons turn to the library website for information, reference, research and instruction.

Bao (2000) surveyed the website home pages of 143 academic institutions and found that only 57% of the institutes' home pages offered links to their libraries' home pages and told the location of a library home page link on its parent institution's home page will determine the visibility of a library and will affect the effective use of the library's online, web-based resources.

McGillis & Toms (2001) described that library web site is its virtual public face—the quasi equivalent of the front door, signage, path finders, collections or surrogates to the

collections, services, and, to an extent, its people. Because library Web sites compete with a host of other Internet services and organizations for clientele, they must capture and motivate the user; provide useful, innovative, and interactive services and products; give the library some form of identity; and encourage repeat visitation while holding the interest of users and simplifying their tasks. They also must do so while supporting the mission of the library, which for an academic library typically is “to foster the search for knowledge and understanding in the University and the wider community.”

According to Jones, an excellent and effective library web site needs two ingredients. First, it has to have the content a user wants and second it needs to allow the user to browse, search and interact with the information in rich and flexible ways (Jones, 2002).

Moyo (2002) observed that subject areas constitute the main approach to seeking information. Organizing by library function or library organizational structure, although logical to librarians, may not be very useful to library users, particularly remote users.

Brower (2004) found the following results from his study of 41 university websites. The most common link of all was to a parent organization. In case of academic Health Science Libraries (HSL), this link was often useful to the college or university main page. Thirty-eight home pages, accounting for 93% of the sites were linked to the parent organization. Parent library links were also tracked, with 46% of the academic HSL home pages linking out to a general library home page and 17% of those home pages also linking to the parent library from PNTs. The most prevalent home page links to library-specific information included links to library news or “What’s New” featuring (80%), library education services including tutorials or class schedules (80%), library hours (68%), descriptions of library services (68%), directions or maps to the library (48%), and staff directories (43%). These services, however, were frequently not linked from the navigation tool. Twenty-nine percent of sites (12) were linked to descriptions of services from PNTs, and 27% (11) linked to library education services, but no other library general information link ranked higher than 20%.

Broader- scoped comparisons, such as King's analysis year of home pages for member libraries of the Association of Research Libraries (ARL) followed. King found that the average number of links on an ARL library home page was 21.6, and that 37% of the libraries he surveyed had between 10 and 19 links on their home pages. But the specifics of what pages and resources were being linked were not discussed in the article (Brower, 2004).

Jasek (2004) described how to design a library website to maximize usability. Elsevier's User Centered Design Group has conducted usability reviews of several academic library web sites including the University of Manchester's Library web site and Hawaii Medical Library's web site and suggested a few tips for making a library website more usable and effective. Study says that into increase use of library website it is necessary to provide hyperlinks for help on every web page. Across all web pages, fonts and colors should be used consistently for a uniform and professional appearance. Library website should be directly linked to home page of university website, use one navigation bar to orient users, use different color to differentiate the links, use library page real estate wisely, use only three to four colors for website designing to give a professional look, organize information in efficient and flexible way, make website search clear, use meaningful terminology than librarians terminology, make library website accessible and test your website for usability frequently. He suggested that a library website should be organized and designed considering the users' point of view. He also pointed out that the biggest mistake library web sites were making was not giving enough space to the task 85% of people come to the library web site for finding research materials like journal articles.

In China, studies were carried out on the specific library website evaluation since 2004. In 2004, Xiaoxing analyzed the evaluative indicators of library website and suggested some factors in website construction. Zunxin (2005) discussed and pointed out the standard of evaluation indicators related to system for a college library website.

Yuxiang investigated 16 public library websites and developed an evaluative system suitable for a public library website and evaluated the usability of IA of the Shanghai Public Library website. Liling, Xiaoyan & Baoqiang studied 30 colleges and university library websites and suggested some points for the development of colleges and university library website developments(Liling, Xiaoyan, & Baoqiang, 2005).

The Online Public Access Catalogue is an online bibliography of library collection that is available to the public. Omoike & Oke (2014) defined OPAC as computerized databases of library's holding. The new generation of Web OPACs allows users to access resources of libraries, publishers, and online vendors (Guha & Saraf, 2005).

Peterson (2006) gave the opinion that librarians should work with library and university administrators to create a well-designed usable library website. To improve library website library administrators should allocate sufficient resources and staff. The library website template should be selected in such a way that students should keep coming back to access the library website. Library websites are crucial to delivering data, research tools and instructions to patrons and the community. Libraries use their website as marketing, public relations and fund raising tool.

According to Poll (2007), website quality of the library depends on the following criteria: adequate language to the population, clear structure, options given for different user groups, up-to-date information and short and concise information. As per him, the library website should always be the main starting-point for searches and the one virtual "entrance" to the library. He highlighted an important issue that library homepage should guide by the shortest possible way to the most-used information.

As described by Liu (2008), the academic library websites are libraries' virtual presentation to the world. Academic library websites provide access to online catalogs, electronic databases, subject resources, library instruction/tutorials, digital collections and are gateways to information that supports faculty and students' research and educational needs.

Laouar, Hacken & Miles (2009) outlined a conceptual model of library web portal with ontological classifications and relationships for scholarly resources at the University of Tebessa in Algeria with which they hoped that scholarly work stations that combine local and remote holdings, tools and documents will be created and which will ultimately benefit from inclusion in a nationwide network. Their findings are first the contribution of web-services to the seamless utility of a scholarly portal is indispensable: interoperable features, formats and protocols can be carefully customized. Second, the conceptual model assists not only in visualization, but in implementation phases of the process of assessment of user needs and behaviors through interface creation and ongoing maintenance. And third, a method for recycling existing applications in constructing new library services is a key component.

A better Library website is one which helps patrons to accomplish their goal quickly. “A user-centered Library website can help patrons feel welcomed and valued in the Library setting. It can also help them efficiently locate quality information, thus leaving more time for study and reflection” (Kimberley, 2011). Kely, Jones & Farrington (2011) suggested that, Library website content must be viewed in much the same way as a physical collection. By applying Dr. S. R. Ranganathan's Fifth Law, Library website is a growing organism and must be treated as such, especially with the complexity of web content.

In 2011, Kim explored the factors affecting users' intentions to use university library website resources and then investigated factors affecting the university library website design and assessed the success of this website from a designer as well as a user's point of view. He suggested that, when university plans for the website then web designer should consider university guidelines, he has to review other websites and consult the library experts who are working in that library. With this the website will be successful. He also gave suggestions on enhancing the usage of this website by the users.

Dhamdhare (2012) mentioned that Library website is a part of public image the mirror of library in a community and therefore can be considered as a mirror of the library which shows its services, collection, facilities, communication media and other information.

Becker & Yannotta (2013) wrote in his article that, in 2008 Hunter College Libraries launched a two-year website redesign process, keeping goals to update the design to position the library as a technology leader on campus, streamline the architecture and navigation, simplify the language used to describe resources, tools, and services and develop a mechanism to quickly incorporate new and emerging tools and technologies. The library committee considered the principles endorsed solid information architecture, clear navigation systems, strong visual appeal, understandable terminology and user-centered design for the new library website. Accordingly the process led to the development of a strong, user-centered site that can be easily changed or adapted to accommodate new resources and technologies. They also presented a model for creating a strong, user-centric web presence by pairing usability testing and the design process. Four rounds of usability testing were conducted throughout the process of building a new academic library web site. Participants were asked to perform tasks which are based on the guiding principles of web usability that served as a framework for a new site using a talk-aloud protocol.

Testing the usability of a website is an ongoing search for perfection and not something that is done once. The focus on testing is to find out what does not work and where users run into trouble. Once that is found by testing, the redesigned websites will work better for users than the old ones. The final aim of any testing and redesigning should be to take into considerations user's advice and views on what they need on the website (Nagarkar & Murari).

In 2013, Kroski advised to create personas before designing library website. Personas are fictional depictions of website's target audiences. To develop a persona, one has to learn about users by interviewing (guided, open ended conversation) them and find the

distinguishing characteristics about library patrons. Analysis of interview transcripts or notes, though time-consuming, is an invaluable opportunity to get to the heart of your users' behaviors, needs, goals, and motivations. The output is a thematically grouped list of behaviors, which is the raw material for your persona and which represents the cornerstone of your website planning process and have an ongoing role as the site evolves. Personas help to ensure that everyone is on the same page about your main demographic.

The survey of about 210 staff and students (2012-13) who were using electronic resources of Nigerian University Libraries was conducted to evaluate the quality of online services in academic libraries in Nigeria using questionnaire method. The modified WebQual four performance indicators were designed and used to measure: library equipment, library website, Online Public Access Catalogue (OPAC) and e-user education in the university libraries. It was suggested that through adequate funding and prudent management of library funds, online services in Nigerian university libraries could meet the international standards in terms of library web-based services (Asogwa, Ugwu, & Ugwuanyi, 2015).

Mehta & Trivedi (2015) carried out study of website contents of 45 central university libraries from 25 states and two territories of India by carefully scanning the websites. In their findings, they observed percentages of libraries, giving following information on their website introduction, about library, history of the library, contact information, copyright information, mission, location information, sitemap of web pages, Library rules, library hours, announcement, membership information, library tour, FAQ, Staff directory, library policies and procedures, library governance, annual reports, library brochure, library collection, e-resources, different sections, library services and technical services along with value added information and services offered by library on their website. They did not study only contents and design of university library websites and focused on information provided not web based applications or tools used by those libraries. They concluded that, many central university libraries are yet to develop to full

potential and make the web based services more interactive and recommended to add use of social networking sites, web 2.0 tools such as blogs, wikis, RSS feed, you tube, android applications etc. for universal identification.

2.9. LIBRARY WEB-BASED SERVICES:

A web service is a software system designed to support computer-to-computer interaction over the Internet. In today's competitive world, the web is an increasingly important resource in many aspects of life like education, employment, government, commerce, healthcare, and almost everywhere. The Web services are typically application programming interfaces (API) or Web APIs that are accessed via Hypertext Transfer Protocol (HTTP) and executed on a remote system hosting the requested services. The W3C defines a "Web service" as "a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-process-able format (specifically Web Services Description Language WSDL) (Singh, Bebi, & Gulati, 2011).

Historically, library services are typically meant reference and information desk services, reader education programs, inter library loan and bibliographic search services. Over last two decades, technology has been used to introduce many new services, either by delivering existing services via electronic media or by developing and implementing entirely new services for a search, delivery and use of information (Poll, 2005). When focus is given on services provided via library website "Web-based services" is the preferred terminology.

In 1999, Borasky in his master's thesis examined the web based library services offered by 15 academic libraries in North Carolina at Chapel Hill (UNC) system via their websites. He used a combination of content analysis and questionnaires. The results of this study demonstrate a broad range of web-based services offered by academic libraries. Most libraries offer a minimum of basic, text-based services, such as descriptive information about the library, policies, and ready reference links. Most libraries also offer

web-based access to the main stay of library services, the online public access catalog (OPAC). Fewer libraries offer more advanced services, such as online request forms, and bibliographies. Fewer still offer innovative services such as digital collections and cross departmental services. This study identified specific ways in which the web, allows libraries to improve and develop services. Some of the key improvements and developments are: a) hyperlinks between resources, such as OPAC records that link directly to web sites or other web-based services; b) cross-departmental services, such as the integration of ILL services with the OPAC; c) simple user interfaces to multiple services, such as the ability to search many electronic databases at one time; and d) remote access to library services, such as digital collections.

Madhusudan (2001) in his survey of 12 selected university libraries in India, he again revealed that, Indian libraries are lagging behind in providing web forms to users in different web-based library services which are effective tools for library-user interaction and communication. His findings showed that, many of the surveyed university libraries have been yet to exploit the full potential of the web and continually develop an effective web-based information literacy programs to provide a high degree of interactivity and flexibility to enhance the use of web-based library services they offer to the users. His work was earliest work which shaded light on the current level of adoption and use of web based library services in university libraries in India. As per him, there was scope to study the university libraries those offers full range of web based services and find the problems faced by users while using them and give direction to other libraries gain a broader perspective on the effective use of web-based library services

Syed (2002) surveyed Arabian Gulf University Libraries via email to know what type of web based services these universities offer to their users. He found that almost all the libraries are offering web-based services like OPAC, search engines, forms, etc. in one or other way. He also discussed how these libraries can improve and reinforce such services in an effective way and create awareness among the patrons in order to create positive environment about this change. His findings also helped other Arabian Gulf libraries to

improve and offer quality web based services. According to him, there was an imperative need for libraries to exercise proper awareness, orientation and training to the patrons in order to make them aware about these services and to realize positive change in the environment. To meet these challenges the librarians need to play a leadership role in providing better web-based library service facilities to their current techno savvy users. The librarians should have the expertise to hold the hands of the users who are moving towards a new communication paradigm a shift from face to face human contact to human machine interaction, from paper to electronic delivery, from text centered mode to multimedia and from physical presence to virtual presence.

Contreras, Probst & Klimczyk (2004) in their case study of expansion of web-based library services in Penn State University libraries observed that users prefer to use library resources from their home and office to study independently and expect full text web access to all resources and their feedback to the library is depend on the libraries' ability to provide web based services. To support users Penn State University Libraries decided to build a comprehensive web-based reference system across their 24 campuses and approximately 50 service points and engage their users in designing new services based on analysis of users' needs.

Bhatnagar (2005) mentioned in her paper that, few emerging web based services in libraries like Virtual library tours, Ask-A-Librarian, Real time services, Bulletin boards, Web based user education and Web forms which libraries can adopt. According to her, in the Indian scenario library Web services will continue to spread out, will offer more full-text electronic journals and indexes, bibliographic access to full-text periodicals. There will be more Web forms for user feedback, and perhaps a virtual librarian who interacts in real time chat or video conferencing. More Document delivery services to distance education or users and savings on Inter Library Loan and user convenience are incentives. Information resources through creative consortia purchasing will be popular. A well-developed user education modules or tutorials, especially to support independent exploration of library and Web resources. Somebody will have to figure out how to keep

Word users from saving print documents as XML, without thinking in terms of Web, not print, space. XML will be embraced as a way to control page appearance and behavior, but it will take a while for people to figure out how to use it well and there will be trends we haven't thought of yet. She also concluded that web-based library services will become more widespread and sophisticated as the web becomes common place throughout the world, and to be successful players in the E-world.

LiLi (2006) discussed key issues involved with challenges and opportunities library professionals facing while spreading awareness and instructing patron at the time of delivering dynamic web based resources and services. He mentioned that, it is very imperative for libraries and librarians to design, develop, enhance, implement, and deliver high quality user-centered information services, resources, and instruction at the fingertips of library users. He also discussed next-generation web-based client/server library information architecture and services in the foreseeable future. According to Wusteman (2006), until the web services are standardized the advantages of web services will not be realized by the library community.

Kraemer, Lombardo & Lepkowski (2007) suggested that, in comprehensive information literacy program online instruction should be one component and should also include librarian-student interaction. This hybrid instructional model will help librarians to address multiple learning styles, to engage students with the latest technology, to respond to external pressures to move into an online teaching environment, and to maintain the physical contact that is vital to student learning. The students enrolled in Rhetoric 160: Composition II (RHT 160) at Oakland University for the 2005 winter semester was the target population for this study. For this study, they selected twelve sections of RHT 160 during the winter 2005 term to compare three instructional methods: online instruction only, live instruction, and the current "hybrid" combination of live instruction and online tutorials. The sections were assigned to one of the instructional methods and, to assess student learning, all students (n=224) completed identifying pre and post-tests. The results of the study, including differences in student performance in relation to pedagogy were discussed.

Farkas (2007) gave an excellent example of Georgia State University Libraries, how academic libraries can leverage their services with Web 2.0. These libraries took blogging to another level of outreach and public service through their subject specialist, liaison efforts by creating subject blogs. The university library uses blogs in conjunction with their reference services where each blog contains a variety of content, including new subject-specific databases, calls for participation and requests for proposals, subject-related world news and studies, book reviews, conference announcements, and relevant library news. He also suggested that, academic libraries should try to create more value with social networking profiles by offering a space for patron to give feedback, by providing news and information, or by providing a portal to library services.

Libraries are facing demands from increasingly techno savvy patrons to expand online library services in new and sometimes usual ways using web tools. Web based library services means the services provided using the internet as a medium and though the website as a gateway with the help of integrated library management system (Madhusudhan & Nagabhushanam, 2012). White (2001) defined library web based services as an information access service in which users ask questions via electronic means e.g. email or web form. According to Arora (2001) technical infrastructure required for generating web-based library services are divided into three categories Collection infrastructure, Access infrastructure and Hardware & Software infrastructure. Web based services require accuracy, promptness, courtesy and understanding of the information need (Sangale, 2015). The web services are only useful and effective if potential users know that they exist, how they can access and what they offer. Information is available to varying degree and in a variety of formats, depending on the service in question (Wusteman, 2006).

Kataria & Anbu (2009) mentioned in his paper how library committee and the librarian of JIIT University planned to start a new interactive library website and on the basis of user feedback proposed a model for learning information center in which they planned to add

new web 2.0 tools like LRC Forum, LRC Wiki, LRC RSS, LRC YouTube videos, LRC Social Networking, Content Tagging and Media tagging to bring users closer to learning information center.

Korah & Cassidy (2009) carried out study at Sam Houston State University to assess student use of and satisfaction with the WebFeat federated search tool implemented by their library. Students voluntarily responded to an electronic survey conducted to collect feedback on how often they conducted class research using the federated search tool, individual databases, and online search engines and how well each search tool satisfied their class research needs. In the result, it was found that, a high rate of federated search use, but only moderate satisfaction; for most students, federated search did not replace individual databases and online search engines, which also saw frequent use for class assignments. Federated search use was highest among lower-level undergraduates, and both use and satisfaction declined as student classification rose.

Chen, Ouyang & Chu (2009) visited 81 academic library websites in the New York State and he found that 42% libraries adopted one or more web 2.0 tools such as blogs while the implementation of these tools in individual libraries varies greatly.

Hatua (2010) mentioned about 20 web based services we can apply on our library and information science field, but most of these services we cannot use as library services. They are as following List Serve, Subject database, community information, Government resources, library catalogue, shopping and other commercial transactions, document delivery, commercial resources, bulletin board, email facilities, surfing facilities, access to the database, bibliographical and cataloguing service, bulletin board service, push based services, ICAS, profit based alert service, E-SDI: Link to remote information, list of acquisition, hosting on web, email delivery, FAQ, ILL and document delivery services, newsletter services, OPAC, Webopac, patent information services, reference services, usenet, uncover, webcasting, whiteboard and virtual library. But as he mentioned now libraries are taking full advantages of the internet and web facilities and remarkably changing their mode of provision of services. Western countries have gone

far miles than developing and underdeveloped countries. These new modes of service are highly effective in special libraries than academic libraries. About why Indian libraries are far backward in offering web based services, he mentioned, national policy of India has no intention of implementing. No infrastructure for implementing web based library services, Government policy of restricted employment opportunity compelled not to take professional manpower as much as required. The various networking system in India simply failed due to lack of good will, effort and ego problem in big libraries. But if libraries will invest initial installation cost they will enable to provide web based services and make them popular, but only when library and information center should become professional about their services in future. This scenario has changed now Indian University libraries are getting sufficient infrastructure to provide web based services to the patrons and also internet facility to patrons in library premises.

In 2010, Chua & Goha addressed the issues related to application of web 2.0 in libraries. He studied to what extent Web 2.0 applications are prevalent in libraries, in what ways Web 2.0 applications have been used in libraries and does the presence of Web 2.0 applications enhance the quality of library websites? They studied total 120 library websites, both public and academic from North America, Europe and Asia. They found that libraries are implementing web 2.0 applications like Blogs, RSS, Instant messaging and applications like social tagging to increase the level of user engagement. The presence of Web 2.0 applications was found to be associated with the overall quality, and in particular, the service quality of library websites.

Harinarayana & Vasantha in 2010 studied the web 2.0 features in university library websites in 2010. They selected 57 universities from the top 100 universities from the 'Times Higher Education Ranking' web site in 2007 out of 200 universities listed on the basis of whether the site was in English had at least one Web 2.0 feature. They collected and analyzed the data visiting their website for web 2.0 features like Blogs, RSS, Instant Messaging, wikis, etc. In his study, they revealed that 37 university libraries out of 57 university libraries uses RSS feeds and Instant Messaging feature for dissemination of

Library news, events, announcements and reference service. 15 university libraries provide blog space for users and only one university uses wiki whereas only three university libraries used Podcast and six libraries were using Vidcast. In their paper, they provided concrete evidence of the application of Web 2.0 in University libraries where most of the earlier studies were on how Web 2.0 tools used in a library context.

Nithya, Srinivasaraghavan, Surulinathi & Gopinath in their pilot study discussed different ways to reinforce and improve the provision of web based services including effective ways to create awareness and delivering orientation to create a positive environment among the students about this change. According to them, Bharatisadan University Library offers following general and common web- based services,subject gateways, bibliographic databases and full text databases, Information alert service, web OPAC, Institutional repository service, live chat in the form of a FAQ, and Virtual Library tour.

In 2011, the survey of ARL Library websites was carried out by Mahmood & Richardson for adoption of web 2.0 in US academic libraries. They found that, all libraries were widely using blogs, micro blogs, RSS, instant chat, social networking sites, podcasts, mashups, vodcasts while wikis, photos and presentation sharing, and vertical search engines were used less. They were using these web tools for marketing their services, providing information literacy instructions and making the users aware about library resources and to collect feedback.

Nagarkar (2011) described in her paper how personalized reference services for Bioinformatics scientists of Savitribai Phule Pune University are being developed using a portal. She used various tools and resources starting with Google Sites as the platform and then integrating RSS feeds, Google gadgets, Google News for current awareness services and PubMed and Google for selected dissemination services.

Shri Ram, Anbu K, John & Kataria (2011) carried out a survey to understand the basic awareness of web 2.0 tools and to create information literacy amongst users by knowing

their expectations and usage of web 2.0 tools and applications at the Learning Resource Centre (LRC), Jaypee University of Information Technology (JUIT), Solan, Himachal Pradesh, India. It was observed that users of the JUIT library were lacking awareness about various Web 2.0 applications necessary for teaching and learning. Therefore, their study provided an insight into implementation of digital libraries, video on demand, reference services, and database services along with some innovative web 2.0 applications at JUIT library to create information literacy.

Web information services are not widespread and have yet to take off widely in academic libraries in India; the diffusion rate of Web 2.0 information services is relatively low (Preedip & Kumar, 2011). Tyagi (2012) has observed that a large number of respondents had knowledge about Web 2.0 tools and were more inclined to adopt the Web 2.0 technologies in their personal lives. However, libraries are lagging behind in using the social networking technologies.

According to Kumar & Subrahmanya (2012), the web and Internet offered a unique medium for businesses to reach beyond geographical boundaries. Web services are characterized by their ability to work in the interoperability among communicating applications by using XML based data. The applications that offer web services are therefore designed to be loosely coupled with nature and services they are offering could synchronous or asynchronous web services. Web services heralded another significant milestone in the history of information technology. Earlier, Internet catered mostly to the business-to-consumer (B2C) category of the users on the web. As against this, web services enable B2B interactions as well since the interaction/transaction is being carried out on the internet, HTTP, SMTP and such transport protocols are used in communication. The key issues involved with opportunities, challenges, and future development trends of delivering dynamic and distributed web-based library information resources, services, and instructions for library users in the digital age (Madhusudhan & Nagabhushanam, 2012).

Madhusudhan & Nagabhushanam (2012) conducted a survey of 20 University libraries in India in 2012 in which he presented current status and use of web by those libraries. They examined how some of the university libraries in India provide web access to their collections and user support for that access and the problems faced by users in accessing Web-based library services. They found that, many surveyed university libraries were not exploited full potential of the web forms and are lagging behind in effective use of library websites. Few university libraries were offering innovative web-based services in different sections. They also pointed out, there was an urgent need to develop dynamic library websites and incorporate relevant Web 2.0 based services including web forms in each web-based library service, apply semantic technologies and ontology and adopt next generation internet and provide multilanguage support content. Their study also examined institutional characteristics and resources dedicated to web-based services.

Svetal & Lalitha (2012) in their study analyzed 173 Indian State Universities for their web presence. They found that, some state universities had more visibility compared to other and also found out the ways to get high web links which helped to improve presence on the web. Their findings suggested that, should emerge the following tools like blogs, social networking sites for scholarly and scientific communication of universities to their websites. They also advised that, Maintaining Institutional Repositories, Open Access, and Collaboration with other universities and Online Communication etc.would also help to increase the Visibility of the particular university library on the web.

The study was conducted by Chiao-Chen (2013) to integrate the unified theory of acceptance and usage of technology studying behavioral intentional of 363 undergraduate and graduate students who used library mobile applications in university libraries. He observed it differs from students to students and therefore university librarians should reinforce the efficiency of library mobile applications to influence users' willingness to use such applications.

Omoike & Oke (2014) discussed some positive effects of OPAC and 239. 50 standards in Nigerian libraries like It allows patrons to use search strategies, hyperlink to search, to search OPAC on the web using common interfaces, timely access to library materials, encourages cooperative collection development and resource sharing. It motivates patrons, equips them with problem solving and information retrieval skills, and provides them with lifelong learning experiences. He also pointed out problems Nigeria libraries are facing while utilization of OPAC like setup and software cost is not affordable, power failure, consistent breakdown, users are abusing copyright, users have technophobia and so it is going difficult to understand and it takes time. Also, libraries have inadequate manpower and lack of committed personnel. He also found that most libraries Online Public Access Catalogue fails to provide information in a helpful way to users as it searches only a fraction of the library's resources. And to find much relevant materialthe library patrons those are familiar with sophisticated commercial Web business expect from their library catalogues should work as along with Amazon.com's website rather than core functionality.

Bhardwaj (2014) investigated how library and information science professionals working in higher education institutions in India integrate social networking sites (SNS) into their routine work. The findings revealed that, information professionals use SNS to socialize, keep themselves up-to-date, find jobs, and acquire information about conferences and seminars in their respective fields.

Dhamdhare & Smet (2015) discussed the current status of various web-based services offered by selecting 14 Five Star University libraries in the USA as per QS World University Rankings 2014 and 28 in India with Higher CGPA (above 3.1) ranked NAAC "A" Grade UniversityLibraries in India to educate their patrons. They also tried to identify best practices followed by another similar kind of libraries for their readers and students. They identified a proper subset of libraries for the USA as a developed country and India as a developing country. They created a list of about 70 identified services offered by these libraries and divided into four main clusters, namely Bibliographical

Services, Patron Education Tools, Web-based Best Practices and Web-based Publishing Platforms for Patrons. In the result they found USA libraries offer on average 53 out of 70 services while Indian libraries only offer 6 on average. They found that, the weakest USA libraries are still stronger than the strongest Indian ones. The ranking the universities by number of offered library web-services do not fit with their official rankings according to the calculated Spearman's rank correlation coefficient for the samples selected from USA and India. Their findings will be useful to university libraries in developing countries to diversify their service and change their profiles into more modern information centers with higher educational potential. The Pearson correlation coefficient of for Indian libraries indicates a positive, but rather a low relationship in between the ranking and the number of library services offered. The same coefficient for USA library websites related to their university's ranking indicates a stronger relationship in between the 'quality' of the universities and their libraries as measured by no. of services offered on their websites and found on Google. They suggested, Indian libraries could benefit from taking inspiration from the list we drew from the USA university library websites, in order to generally raise the level of such services offered, but also to change the nature into a more diversified spectrum of services offered, showing that, modern libraries are closely following the possibilities of the new information web-based era.

Recently in 2016, a comparative study of the use of social media tools by 34 reputed university libraries of the world and 15 top university libraries in Pakistan was conducted by Sheikh, Syed & Naseer indicated that, University libraries in Pakistan are extremely lacking in the use of social media tools compared to world university libraries. They selected top World University libraries from only Canada, Australia, USA, UK and Malaysia and not all countries. The social media tools they shortlisted were Face book, Twitter, LinkedIn, You Tube, Flickr, Pinterest, Orkut, Tagged, MySpace, Google plus, Live Journal, Photo bucket, Picasa, Slide share, Blogs, and RSS. This study clearly indicated that, university libraries in developed countries are making wide use of social media tools compared to Pakistani university libraries. From the selected world top

university libraries total 89.28% provided links to social media tools on their library web portal. They also found that, Face book and Twitter are top social media tools used by top world university libraries. This study was based on only those university libraries who responded. They concluded that, Pakistani university libraries are lacking in the use of social media tools and must make effective use of such social media tools for promotion of their library services.

Mustafa, et.al. (2016) studied social media promotion tools in one academic library which is equivalent to the university library in Malaysia and found that as web 2.0 applications Facebook and twitter have been widely used in academic libraries since 2009 and recognized as a new communication channel to get user's feedback and insights towards library services and activities.

Tella & Oladapo (2016) studied 20 University Library websites comprising ten top-ranking Nigerian Universities and ten top-ranking South African Universities for content analysis and use of web 2.0 tools. He found that, the South African University Libraries are ahead of Nigerian University Libraries in terms of the integration of Web 2.0 tools, e-resources and e-databases and provide platforms to their patrons for easy information retrieval. There are more e-resources available on the South African University Library websites compared with their Nigerian University Library websites. Both countries university libraries gave access to e-Journals are the most available e-resources in the selected university library websites of both countries. Similarly, more academic e-databases are available on the South African University Library websites, whereas only a few are listed on the web pages of the selected Nigerian University Library websites. Because of the wide variation reported in this study concerning available tools and resources on the University Library websites in South Africa and Nigeria, it was recommended that African Universities should come up with a standard that will mandate universities to have a certain number of tools identified on their various University Websites.

Similarly Vaughan & Gao (2016) examined the use of microblogs and social networking services by academic libraries in the United States and China. He studies total 200 top university websites and social media accounts and search engines. His findings indicated that, the adoption rates of microblogs and social networking services were higher among the U.S. libraries as measured by the number of libraries that had an account in each type of social media studied. However, the number of accounts for the Chinese libraries was increasing faster during his four month study period. The U.S. libraries were found to have started using the social media earlier, but the Chinese libraries attracted more users measured by either the absolute or the relative number of followers of the libraries' microblog accounts.

Moyo & Mavodza (2016) compared the provision of information literacy (IL) skills to university students both at undergraduate and graduate levels in South Africa (SA) and the United Arab Emirates (UAE). Their study will assist policymakers and librarians in the development of appropriate IL programmes in support of teaching and learning.

From above all earlier studies and research the investigator observed that, most of the studies till date are related to web 2.0 applications in the libraries forgetting basic library services on the web like bibliographical services, patron education services, communication services, research services, publication services, etc. and new innovative practices. There is need to apply new services and technology in the library but at the same time there is need to improve basic fundamental library services through web. Considering these issues, the investigator prepared inventory of maximum services visiting various top university libraries from all over the world to help Indian libraries or developing country libraries to improve their online services to their patron.

2.10. UNIVERSITY ACCREDITATION AND RANKINGS:

To select the top universities in the world, it is observed that accreditation process of different countries differs. The quality of a university is evaluated by external bodies (Non- Government Organization) in a few countries at the national or regional level and in a few countries universities are evaluated by the Ministry of Education of that country e.g. France, Russia . The criteria or standards defined by these agencies differ from country to country. In Germany 10 certified agencies of accreditation are working, In Canada, Association of Universities and Colleges of Canada evaluate universities. There are few agencies that do ranking of universities from all over the world every year by applying specific criteria and methodology like ‘Times Higher Education World University Rankings’, ‘QS World University Rankings’, ‘Centre for World University Ranking’ CWUR World University Rankings, ‘UI Green Metric World University Ranking, Kaggle World University Ranking’, ‘CWTS Leiden Ranking’, ‘University Ranking by Academic Performance’ (URAP), etc. In few cases university needs to enroll in the ranking system. Many un-enrolled universities are not evaluated in this system. Many countries like India are not reflected in the top university rankings mentioned above. In ‘QS World University Rankings’ or ‘Times Higher Education World University Ranking’ or ‘CWUR World University Rankings’ or ‘U.S. News Best Global University Rankings’, ‘Shanghai Ranking’ all top ranked universities are mainly from USA, UK, Canada, Australia. Therefore, it is observed by the investigator that, the idea of selecting top universities from the globe as a sample is not fulfilling with these rankings though they have separated rankings country wise or region wise. The investigator found more suitable ranking system is ‘**Webometrics Ranking of World Universities**’ which is a initiative of Cybermetrics Lab were selected as the key pillars of what makes a world class university, taking into account a number of factors that are often overlooked in university rankings and other assessments like Research, Teaching, Employability, Internationalization, Facilities, Online/Distance Learning, Engagement, Innovations, Culture, Access and specialist criteria like excellence to claim world Class status.

It is a non-profit company which gives transparency in ranking. It uses link analysis for quality evaluation as it is a far more powerful tool than citation analysis or global surveys. It tries to do the best for not including fake institutions by checking them online or international and foreign branches if they have an independent web domain or sub domain. Webometrics measure not only research output, including both formal (e-journals, repositories) publications and informal scholarly communication, teaching, the scientific impact of the university activities, but also the economic relevance of the technology transfer to industry, the community engagement (social, cultural, environmental roles) and even the political influence.

Total 70 traditional universities out of 11999 World's best university rankings, based on 'Webometrics Ranking of World Universities' are selected from various areas of the world including World, Brics, Civet, Latin America, Caribbean, Asia/Pacifico, Middle East, South East Asia, Oceania, Europe, Central Eastern Europe, Africa, North Africa and Arab World. With this selection investigator covered all top university libraries in the World, Brics Civet, Asia, Oceania, Europe, Africa and Arab World first and then from the regions they covered. The repeated universities from World, Brics, and Civet are excluded in the related area. From each area 5 top traditional university libraries are selected for getting a global view of web-based services offered by these university libraries.

From India, the investigator used rank/grade given to Indian universities by 'National Assessment and Accreditation Council'(NAAC), which is an autonomous body appointed by University Grants Commission. Total 39 University libraries out of 53 Accredited as "A" Grade by the NAAC valid from 2009 to 2016 are selected for this study. The criteria to select university libraries used were, according to CGPA score given by NAAC. Traditional universities scoring above 3.0 CGPA were selected and listed state wise.

2.11. CONCLUSION:

This chapter gives an idea about what is web, web based services, development and application of web technologies to change traditional libraries into library 1.0, 2.0, and future 3.0 and 4.0. The investigator mentioned the review of literature studied from the library websites came into existence and how libraries started offering various web based services till date. For this study to select sample universities of the world and India, why specific ranking and accreditation system used is also discussed.

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Chapter3

RESEARCH METHODOLOGY

CHAPTER 3

RESEARCH METHODOLOGY

3.1. INTRODUCTION:

This chapter includes the research method, sampling technique, data collection and evaluation methods used by the investigator to carry out this research. Research design and limitations of this research is also discussed in this chapter.

3.2. RESEARCH METHODS:

Survey Method: Survey Method for ‘World’ and ‘Indian’ University Libraries by surfing their websites, blogs, social network accounts and Google platform was followed.

This research from a methodological point of view contains the following elements:

- Identification of a proper subset of libraries from the Globe and India
- Creation of a list of web-based services and best practices from what could be found on the library website/blog.
- Producing an inventory of these services by checking them on each of the library websites of selected universities and Google platform.
- Analysis of web-based bibliographic services, patron education practices, patron communication tools, web-based publishing platform for patrons through web.
- Comparing the results for top World University Libraries from different areas and Indian University Libraries web-based services.

Research methodology was only using a quantitative evaluation of services.

3.3. SAMPLE

3.3.1. UNIVERSITIES

For comparative study of web-based services and best practices offered by top world university libraries and NAAC “A” grade university libraries of India, the investigator

collected samples from the ‘Ranking Web of Universities’ (<http://www.webometrics.info/en>) and ‘NAAC’ website of India (NAAC).

For rating the world universities “**Webometrics Ranking of World Universities**” which is a largest academic ranking of higher education institutions and an initiative of the ‘**Cybermetrics Lab**’ (**Spanish National Research Council, CSIC**) were selected as it is a ranking of all the universities of the world, not only a few hundred institutions from the developed world.

To select the top universities of the world, it is observed that accreditation process of different countries differs. The quality of university is evaluated by external bodies (Non-Government Organization) in a few countries at national or regional level and in some other countries universities are evaluated by the Ministry of Education of that country e.g. France and Russia. The criteria or standards defined by these agencies differ from country to country. In Germany 10 certified agencies of accreditation are working, In Canada, association of universities and colleges of Canada evaluates universities. There are few agencies that do ranking of universities from all over the world every year by applying specific criteria and methodology like ‘Times Higher Education World University Rankings’, ‘QS World University Rankings’, ‘Centre for World University Ranking’ (CWUR), ‘World University Rankings’, ‘UI Green Metric World University Ranking’, ‘Kaggle World University Ranking’, ‘CWTS Leiden Ranking’, ‘University Ranking by Academic Performance’ (URAP), etc. In few cases, the university needs to enroll in the ranking system. Many un-enrolled universities are not evaluated in this system.

Many countries like India are not reflecting in the top university rankings mentioned above. In ‘QS World University Rankings’ or ‘Times Higher Education World University Ranking’ or ‘CWUR World University Rankings’ or ‘U.S. News Best Global Universities Rankings’ and ‘Shanghai Ranking’ all top ranked universities are mainly from USA, UK, Canada and Australia.

Therefore, it is observed by the investigator that, the idea of selecting top universities from the globe as a sample is not fulfilling with these rankings though they have separated rankings country wise or region wise. Investigator found more suitable rankings system '**Webometrics Ranking of World Universities**' which is an initiative of Cybermetrics Lab was selected as the key pillars of what makes a world class university, taking into account a number of factors that are often overlooked in university rankings and other assessments like research, teaching, employability, internationalization, facilities, online/distance learning, engagement, innovations, culture, access and specialist criteria like excellence to claim world class status.

It is a non-profit company which gives transparency in ranking. It uses link analysis for quality evaluation as it is a far more powerful tool than citation analysis or global surveys. It tries to do the best for not including fake institutions by checking them online or international and foreign branches if they have an independent web domain or sub domain. Webometrics measure not only research output, including both formal (e-journals, repositories) publications and informal scholarly communication, teaching, the scientific impact of the university activities, but also the economic relevance of the technology transfer to industry, the community engagement (social, cultural, environmental roles) and even the political influence.

Total 70 traditional universities out of 11999 world's best university rankings, based on '**Webometrics Ranking of World Universities**' were selected from various areas of the world including World, Brics, Civet, Latin America, Caribbean, Asia / Pacifico, Middle East, South East Asia, Oceania, Europe, Central Eastern Europe, Africa, North Africa and Arab World. With this selection the investigator covered all the top university libraries of the World, Brics Civet, Asia, Oceania, Europe, Africa and Arab World first and then from the regions they covered. The repeated universities from World, Brics, and Civet are excluded from the related area universities. From each area 5 top traditional university libraries were selected for getting global view of web-based services offered by these university libraries.

This study tried to cover university libraries spread evenly all over the world. Table 3.1 shows the selected list of universities from different parts of world.

Table 3.1- Webometrics Ranking of World University Libraries

WORLD						
Rank -ing	World Rank	University	Presence Rank*	Impact Rank*	Openness Rank*	Excellence Rank*
1	1	Harvard University	6	2	1	1
2	2	Stanford University	2	3	56	3
3	3	University of California Berkeley	28	4	178	15
4	4	Cornell University	18	5	72	20
5	5	University of Michigan	19	7	73	5
BRICS						
1	34	Universidade de São Paulo USP	33	78	7	80
2	47	Peking University / 北大	216	63	161	48
3	49	Tsinghua University China / 清大	384	44	204	44
4	65	Zhejiang University (National Che Kiang University) / 浙大	293	53	428	71
5	83	Shanghai Jiao Tong University / 海通大	38	195	140	101
CIVETS						
1	277	Istanbul University	69	594	59	640
2	328	University of Cape	1039	568	352	267

		Town				
3	462	Stellenbosch University	757	1120	214	454
4	473	Universidad Nacional de Colombia	388	818	100	989
5	474	Cairo University	760	449	1236	633
LATIN AMERICA						
1	56	Universidad Nacional Autónoma de México	45	68	14	314
2	152	Universidad de Chile	79	236	33	497
3	175	Universidade Estadual de Campinas UNICAMP	200	385	25	336
4	185	Universidade Federal do Rio Grande do Sul UFRGS	25	596	5	439
5	266	Universidade Federal do Rio de Janeiro	530	538	76	358
CARIBBEAN						
1	593	Universidad de Puerto Rico	1640	604	1669	594
2	895	University of the West Indies	1991	1096	1003	1270
3	945	Universidad de	271	1844	1791	1041

		Puerto Rico Mayaguez				
4	1680	Universidad de la Habana	2007	3093	1702	1997
5	1875	University of the West Indies at St Augustine	2063	4586	1266	1904
ASIA/PACIFICO						
1	30	National Taiwan University	11	70	19	102
2	51	Seoul National University / 서울대	58	59	342	78
3	60	University of Tokyo / 東大	208	109	176	25
4	82	University of Hong Kong	91	165	74	129
5	87	Kyoto University / 京都大学	97	260	71	62
MIDDLE EAST						
1	207	Hebrew University of Jerusalem	22	344	1104	203
2	221	Tel Aviv University	118	440	790	135
3	244	King Saud University	141	315	564	397
4	277	Istanbul University	69	594	59	640
5	363	University of Tehran	809	912	57	384
SOUTH EAST ASIA						
1	116	National University of Singapore	767	202	210	40

2	213	Kasetsart University	67	54	486	1273
3	308	Mahidol University	312	321	533	572
4	420	Universiti Putra Malaysia	170	1088	158	591
5	480	Universiti Sains Malaysia	572	1175	332	442
OCEANIA						
1	80	University of Melbourne	332	147	232	34
2	85	University of New South Wales	185	121	348	74
3	92	University of Queensland	772	162	63	47
4	99	Australian National University	284	103	266	139
5	114	Monash University	511	82	917	70
EUROPE						
1	15	University of Cambridge	21	18	326	10
2	16	University of Oxford	34	20	305	8
3	24	University College London	49	60	108	11
4	42	University of Helsinki / Helsingin yliopisto	26	124	4	100
5	45	Utrecht University / Universiteit Utrecht	85	134	39	30
CENTRAL EASTERN EUROPE						
1	96	Charles University in Prague /	62	139	123	229

		Univerzita Karlova v Praze				
2	129	Lomonosov Moscow State University / Московский государственный университет М В Ломоносова	162	142	119	341
3	168	University of Ljubljana / Univerza v Ljubljani	53	309	153	352
4	170	Masaryk University in Brno / Masarykova Univerzita v Brně	77	330	2	706
5	287	Jagiellonian University / Uniwersytet Jagielloński	106	439	526	435
AFRICA						
1	494	University of Pretoria	404	1247	162	608
2	563	University of the Witwatersrand	1383	1334	356	414
3	830	University of Kwazulu Natal	2013	1534	1349	559
4	855	University of Nairobi	330	2579	29	1400
5	1022	University of the Western Cape	1144	1827	990	1236

NORTH AFRICA						
1	1050	American University in Cairo	1182	974	1149	2207
2	1167	Mansoura University	1423	1674	2878	1047
3	1419	Benha University	2194	1779	1415	2252
4	1448	Alexandria University	1142	3192	2961	996
5	1781	Université Djillali Liabes	8305	1336	4414	1850
ARAB_WORLD						
1	780	King Abdulaziz University	281	2032	1061	690
2	989	American University of Beirut	1810	2302	602	882
3	1061	United Arab Emirates University	1516	1539	2304	986
4	1167	Mansoura University	1423	1674	2878	1047
5	1350	University of Baghdad	1038	1515	1131	2697
Total universities of the world selected :70						

Map 3.1 shows, how the 'world' category of universities selected are spread equally all over the world.

Map 3.1: Sample of world universities on the world map (Horizontal view)



In India, 'National Institutional Ranking' of academic institutes is introduced in 2016 by Ministry of Human Resource Development (MHRD), Government of India on the basis of university's teaching, learning and resources; research, consulting and collaborative performance; graduation outcome; outreach and inclusivity and perception. Prior to 2016, the universities were ranked by 'NAAC', 'National Board of Accreditation' (NBA) and 'ISO' certification. Out of these three NBA are for Engineering and technical institutes. Not all universities apply for 'ISO' certification and it is not mandatory too. But University Grants Commission of India made it mandatory to all educational institutions to apply for accreditation every 5 years.

In this research investigator chose traditional universities and not technical universities. Therefore, to select sample top university libraries of India, the investigator used ranking given to Indian universities by NAAC, which is an autonomous body appointed by University Grants Commission. Total 39 University libraries out of 53 accredited as "A" grade by the NAAC valid from 2009 to 2016 were selected for this study. The criteria to select university libraries used were according to CGPA score given by NAAC. Traditional universities scoring above 3.0 CGPA were selected and listed state wise.

Please see Table 3.2 below for the sample list of University Libraries of India selected.

Table 3.2- India NAAC "A" grade university libraries

Sr. No	Grade	University	Accreditation (Valid/Not Valid)	CGPA/Percent -age	Rank	Validity Period
ANDHRA PRADESH						
1	A	University of Hyderabad	Valid	3.72	3	February 2019
2	A	Koneru Lakshmaiah Education Foundation, Greenfields, Kunchanapalli	Valid	3.16	12	December 2017

3	A	Sri Venkateswara University, Tirupati	Valid	3.13	15	March 2014
4	A	Sri Sathya Sai Institute of Higher Learning, Prasanthinilayam, Anantapur	Valid	3.06	21	December 2015
5	A	Kakatiya University, Warangal	Valid	3.02	24	June 2014
HARYANA						
1	A	Guru Jambheshwar University of Science and Technology, Hisar	Valid	3.26	9	June 2014
2	A	Maharishi Dayanand University, Rohtak	Valid	3.03	23	June 2018
JAMMU & KASHMIR						
1	A	Jammu University, Jammu Tawi	Valid	3.13	15	June 2014
2	A	Kashmir University, Srinagar	Valid	3.11	17	August 2016
KARNATAKA						
1	A	Mysore University, Mysore	Valid	3.47	5	December 2017
2	A	Jagadguru Sri Shivarathreeswara University, Mysore	Valid	3.34	7	June 2018
3	A	KLE Academy of Higher Education and Research, Belgaum	Valid	3.16	12	March 2015
4	A	NITTE University, Mangalore , Karnataka	Valid	3.11	7	October 2018

5	A	Kannada University, Hampi, Kamalapura	Valid	3.02	24	August 2017
MADHYA PRADESH						
1	A	Devi Ahilya Vishwavidyalaya, Indore	Valid	3.09	19	February 2019
MAHARASHTRA						
1	A	Tata Institute of Social Sciences, Deonar, Mumbai	Valid	3.88	2	December 2014
2	A	Indira Gandhi Institute of Development Research, Mumbai	Valid	3.64	4	August 2016
3	A	Padmashree Dr. D.Y. Patil Vidyapeeth, Navi Mumbai	Valid	3.35	6	Septembe r 2014
4	A	SYMBIOSIS International University, Pune	Valid	3.35	6	January 2014
5	A	Bharati Vidyapeeth, Pune	Valid	3.16	12	October 2016
MEGHALAYA						
1	A	North Eastern Hill University, Shilong	Valid	3.03	23	Septembe r 2014
MIZORAM						
1	A	Mizoram University, Aizawal	Valid	3.12	16	February 2019
ORISSA						
1	A	Shiksha 'O' Anusandhan, , Orissa	Valid	3.10	18	Septembe r 2014

RAJASTHAN						
1	A	Jain Vishva Bharati Institute, Ladnun	Valid	3.11	17	June 2018
2	A	Banasthali Vidyapith, Banasthali	Valid	3.02	24	October 2016
TAMILNADU						
1	A	Alagappa University, Alagappa Nagar, Karaikudi	Valid	3.21	11	October 2016
2	A	Bharathidasan University, Tiruchirappalli	Valid	3.16	12	August 2017
3	A	Bharathiar University, Coimbatore	Valid	3.02	24	March 2015
4	A	Gandhigram Rural Institute, Gandhigram	Valid	3.02	24	August 2015
5	A	Avinashilingam Institute for Home Science & Higher Education for Women, Coimbatore	Valid	3.01	25	June 2018
UTTAR PRADESH						
1	A	Dayalbagh Educational Institute, Agra	Valid	3.14	14	October 2018
2	A	Amity University, Noida, Uttar Pradesh	Valid	3.13	15	March 2017
WEST BENGAL						
1	A	Calcutta University,	Valid	3.30	8	December

		Kolkata				2014
NCT OF DELHI						
1	A	Jawaharlal Nehru University, New Delhi	Valid	3.91	1	June 2017
2	A	TERI School of Advanced Studies, New Delhi	Valid	3.26	9	March 2018
3	A	Rashtriya Sanskrit Sansthana, Janak Puri, New Delhi	Valid	3.25	10	June 2017
4	A	Jamia Hamdard, New Delhi	Valid	3.08	20	December 2015
5	A	Guru Gobind Singh Indraprastha Vishwavidyalaya, Kashmere Gate, Delhi-	Valid	3.05	22	October 2018
PONDICHERRY						
1	A	Pondicherry University, Pondicherry	Valid	3.15	13	October 2016
Total universities from India selected: 39						

Map 2 shows the traditional universities selected for this research are from various states in India.

Map 3.2 Sample of top universities from India



3.3.2. WEB-BASED SERVICES AND BEST PRACTICES

The investigator browsed sample world and Indian university library websites and blogs to prepare inventory of web-based services and best practices offered by them. An exhaustive inventory of about 63 different web-based services and best practices offered by these university libraries was listed. Then these services and best practices were checked for all the sample university libraries individually through their websites and blogs. While checking services like patron communication tools and education tools it is observed that few of them were not reflecting on the website and blog of some of the university libraries, so investigator cross verified these services using Google platform and service providers accounts like Facebook, Twitter, Instagram, Wordpress, iTunes, YouTube, Prezi platform, Wiki etc. The screenshots of each service from each library is kept for the record.

All these selected web-based services and best practices are divided into three parts as below. The details and overview of each web-based service and best practices are given in chapter four along with examples and screen shots of few university libraries.

PART A: Cluster of web-based services: In this part the web-based services offered by selected university libraries are categorized into four different clusters namely

1. Bibliographical services:
2. Patron education tools/services:
3. Patron communication tools/services:
4. Web-based publishing platform for patrons

PART B: Web-based best practices

PART C: Single web page university library

The inventory/list of library web based services and best practices prepared and shortlisted for this study is given below:

Part A: Web-based services:

1. Bibliographical services

1. Web OPAC
2. Access to Databases
3. Federated Search/E-Information Discovery Tools
4. Datasets
5. Find a Library
6. Archives /Digital Collection/IR
7. Visual Database
8. Off campus access
9. New arrivals
10. ILL
11. e-document Delivery
12. Book Recommendations

2. Patron education tools/services

1. News
2. Upcoming Events
3. Weblog
4. WordPress
5. Instant Chat/messaging
6. Ask Us
7. Research/Subject guides
8. Video Tutorials
9. FAQs
10. YouTube
11. Service Directory
12. PPTs/PDFs
13. Research Tutorials
14. Tips for access and use
15. Newsletter
16. Help/User guides

17. RSS Feeds
 18. Mobile App
 19. Live/Online Sessions
 20. Prezi(PPT tool)/slideshare
 21. Audio Tutorials
 22. Maps Directions
 23. Feedback
 24. Live/online Videos Library
 25. Library Calendar
 26. Photo Gallery
 27. Text Instruction
- 3. Patron communication tools/services**
1. Facebook
 2. Twitter
 3. Email
 4. Tumblr
 5. Stumbleupon
 6. Linked in
 7. Flickr
 8. Pinterest
 9. iTunes
 10. Instagram
 11. Delicious
 12. Google+
 13. Foursquare
 14. Whatsapp
- 4. Web-based publishing platform for patrons**
1. Open Access Initiatives
 2. Platform to authors and journals
 3. University Records Management
 4. Anti-plagiarism Software access/Plagiarism help

5. Citation Tools
6. Coursework

Part B. Web-based best practices

1. Online Exhibitions
2. Virtual Tour
3. Wikis
4. Interactive games, puzzles and movie/short films

Part C. Single web page university libraries

3.4. RESEARCH DESIGN

3.4.1. PHASE 1

- Review of literature for previous study done on related topics
- Selection of libraries where study has been conducted.
- Inventory of library web based services, best practices and technology used in top universities in the ‘World’ and ‘India’ was prepared

3.4.2. PHASE 2

- Data collection by browsing each and every selected university library website, portal, blog, online service provider’s account, Google etc. Screen shots of each service offered by each university selected for the study are recorded and kept for verification and authenticity of data collected.

3.4.3. PHASE 3

- Analysis and comparison of the collected data
- Finding of new web-based services and best practices
- Recommending new web-based services and practices for future Indian university libraries.

3.5. ANALYSIS OF DATA:

The data collected for all the web-based services listed above by all 109 university libraries are entered in the excel sheet and then **Chi-Square test** and **T-Tests** were applied for analysis of that data to find the results. The test score shows the difference between 'world' and 'Indian' libraries for their significance. Cross tables in data analysis chapters shows **percentage scores** of each and every services and best practices offered by 'World' and 'Indian' universities and overall percentages along with their count.

The main method of testing cross-tables used in this research is **Chi-square p-value**: it is a test to check how high the probability is that the difference which seems to exist in a table (e.g. world-universities have more database-access than Indian) is based on co-incidence. The real test is based on values in published tables for such tests which have world-wide accepted values for such research. So, if p-value is .05, this means that only in 5 out of 100 cases the difference noted will be based on co-incidence, therefore not be real. But in 95 % of cases the difference is meaningful, not based on co-incidence. That is the threshold (5%) which mostly is taken as the minimum. Lesser values, e.g. 1 % or even 0.5%, are better, because it means chances that the differences are co-incidental are very low.

T-Test: T-Test is normally used to assess whether the means of two groups are statistically different from each other. Here this test shows that means of different services (e.g. bibliographical, patron education, patron communication services, etc. along with best practices) offered by 'world' and 'Indian' university libraries are statistically different from each other.

For correlations, which is a totally different statistical analysis, the interpretation is different: how much is one phenomenon (in this case: ranking of university libraries) linked to another (e.g. ranking of universities). A result of 1 (which does not exist in reality, it is theoretical) would mean that both phenomena are equal: every change in one

would cause the other to change also. A result of 0 means that the two phenomena are totally independent, e.g. the number of sand grains on a beach related to the volume of water used for your shower. Mostly in social sciences a score of 0.3 and everything higher is considered to be 'high', even if it means that less than half the 'variation' in between two phenomena is caused by a factor. **Spearman Coefficient correlation** values are calculated for world/Indian university ranking and library rankings given as per results of their web-based services offered.

3.6. CONCLUSION

The survey and quantitative methods were applied for this comparative study. To select top university samples of 'world; and 'India' 'Webometrics Ranking of World Universities' and 'NAAC' rankings were used respectively. For data analysis percentage score of services count, Chi Square tests for testing significance ratio and for comparing rankings of universities and their libraries Spearman correlation coefficient was calculated.

3.7. REFERENCES

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Chapter4

**WEB-BASED SERVICES
AND
BEST PRACTICES
OFFERED BY
UNIVERSITY LIBRARIES:
AN OVERVIEW**

CHAPTER 4

WEB-BASED SERVICES AND BEST PRACTICES OFFERED BY UNIVERSITY LIBRARIES: AN OVERVIEW

4.1. INTRODUCTION:

The research is related to the study of web-based services and best practices in traditional top University Libraries in the world and India. In chapter 2 “Review of Related Literature and studies”, the investigator added a review of studies and research carried out earlier so far on this topic. Most of the studies were related to the application of web 2.0 tools by university libraries (especially social networks), the evaluation of websites, website design or model, and the usability of library websites. Here in this research, the investigator prepared an inventory of web-based services and best practices offered by selecting traditional top university libraries in the world. The investigator thoroughly went through the websites, blogs of traditional university libraries in the world as well as using the Google platform and searched the services offered by these libraries by going through their accounts on various platforms of online service providers. This chapter gives an overview of all the web services and best practices the researcher investigated and searched. Screenshots of web-based services and best practices offered by selected sample University libraries are given as an example.

In this research, the investigator shortlisted 59 web-based services and main 4 best practices offered by selecting top University libraries by browsing their website and searching their accounts on various service platforms and through Google. Here not only web 2.0 tools and services covered, but also other library services and best practices offered by the university libraries through the web to their patrons are studied and divided into three parts as below:

Part A. Web-based services offered by University Libraries: In this section 59 library services offered by the university libraries through web for various purposes using

various software and web tools are mentioned. Further investigator clustered all these web-based services in four categories under headings:

1. Web-based bibliographical services
2. Web-based patron education tools
3. Web-based patron communication tools and
4. Web-based publishing platform for patrons

Part B. Web-based best practices offered by University Libraries: In this section investigator mentioned more than 4 innovative best practices offered by few top world university libraries which other university libraries also can implement for their patrons.

Part C. Single web page University Libraries: This section is reserved for the university libraries having a single web page with very less information and web based services. Most Indian University Libraries found who have a single web page on the university website. Here the investigator used website and Google platform to collect information. The services offered within the campus or on the intranet are not listed.

4.2. PART A. WEB-BASED SERVICES OFFERED BY UNIVERSITY LIBRARIES

Let's discuss these web based services offered by selecting top world university libraries in the world cluster wise.

4.2.1. WEB-BASED BIBLIOGRAPHICAL SERVICES: The first cluster of web-based services offered by top traditional university libraries are related to their web based bibliographical services. According to Wikipedia, bibliography is organized listing of books and the systematic description of books as physical objects. As a discipline it is an academic study of books as physical and cultural objects. In traditional libraries, records of books were maintained in card catalogues (Bibliography).

Bibliographical services are services related to the library collection and access to those collections, whether print or online. In modern libraries, these services are provided online through website. In the National Library of Philippines there is a separate technical

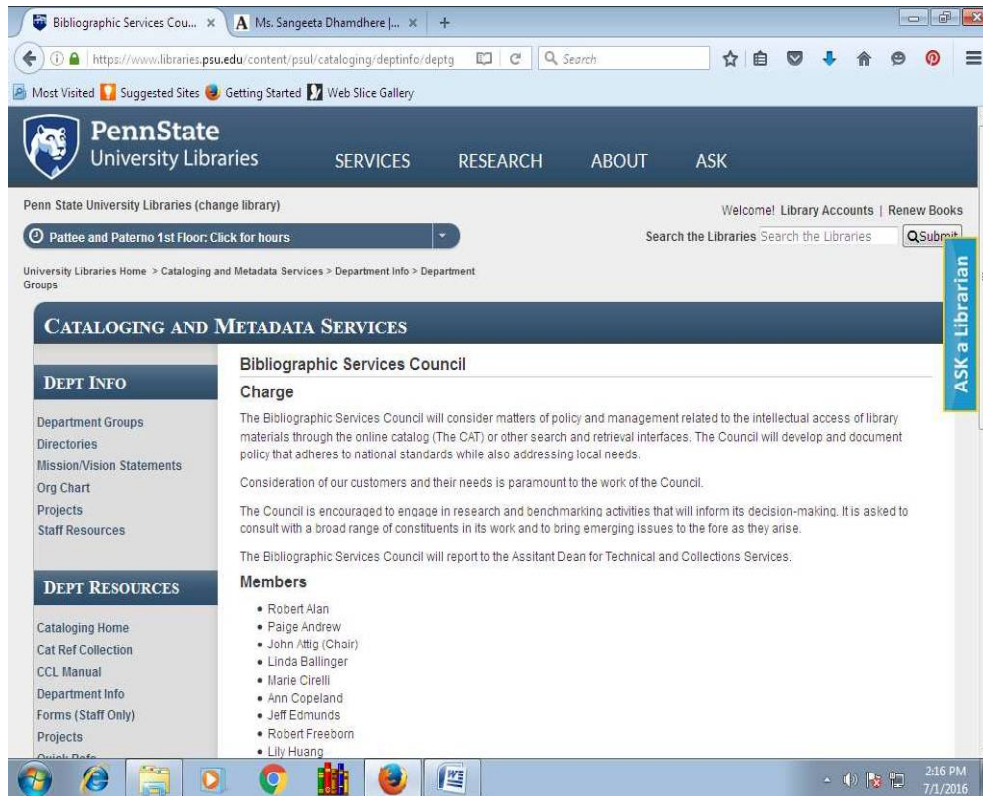
division for offering bibliographical services which maintains an up-to-date national bibliography and union catalogue, provides online periodical indexing of the serials and special collections, serves as national centre for providing ISSN, ISBN and ISMN numbers, maintains comprehensive and authoritative national bibliographic record for every item of literature issued in the country according to international standards and promotes international networking with other countries to provide inter library loan (Bibliographical Services).

The main aim of the Nanyang Technological University's Bibliographical services division is to provide users intellectual access to the library's physical and digital resources and assist them in discovering and locating information resources. This division is responsible for the creation and maintenance of catalogues and other metadata records of the library resources in all formats including print, AV and electronic. This department ensures the library material acquired are effectively and efficiently retrieved and utilized. This department manages memberships, subscriptions and keeps up to date with bibliographic utilities for acquisition and creation of bibliographic records. This department also provides metadata consultancy, development and production services across various subject fields and platforms(Nanyang Technological University). Investigator observed that in the USA relatively more emphasis is given to non-traditional services than India, or vice-versa: Indian libraries still mainly focus on more traditional bibliographical services.

Similarly, the University of Zimbabwe Library's bibliographical services division caters acquisition, cataloguing, OPAC, online databases and institutional repositories (Bibliographic Department). The Cork City Libraries also record maintenance for display on the online catalogue and timely allocation of reading materials to libraries (Bibliographic services). The Bibliographic Services Council of the Penn State University considers matters related to the intellectual access of library materials through the online catalog or other search and retrieval interfaces (Cataloguing and metadata services).

Please refer Screenshot 4.1 of the Penn University Library's bibliographical services given below.

Screenshot 4.1: Penn State University Library's bibliographical services

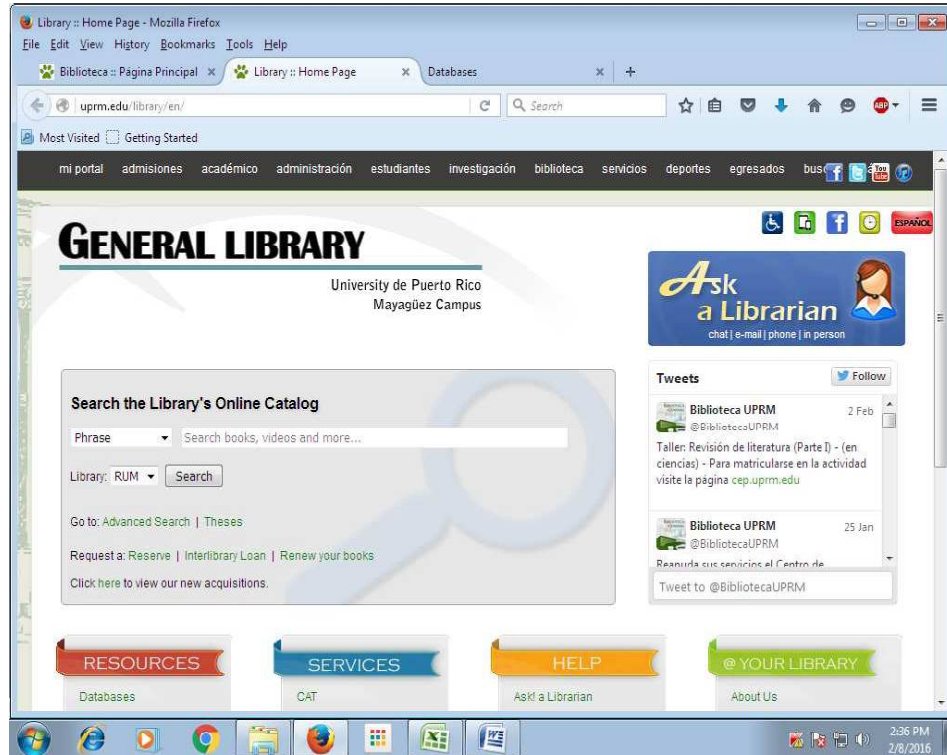


In this research investigator studied 109 university library websites and listed 12 web-based bibliographic services as mentioned here.

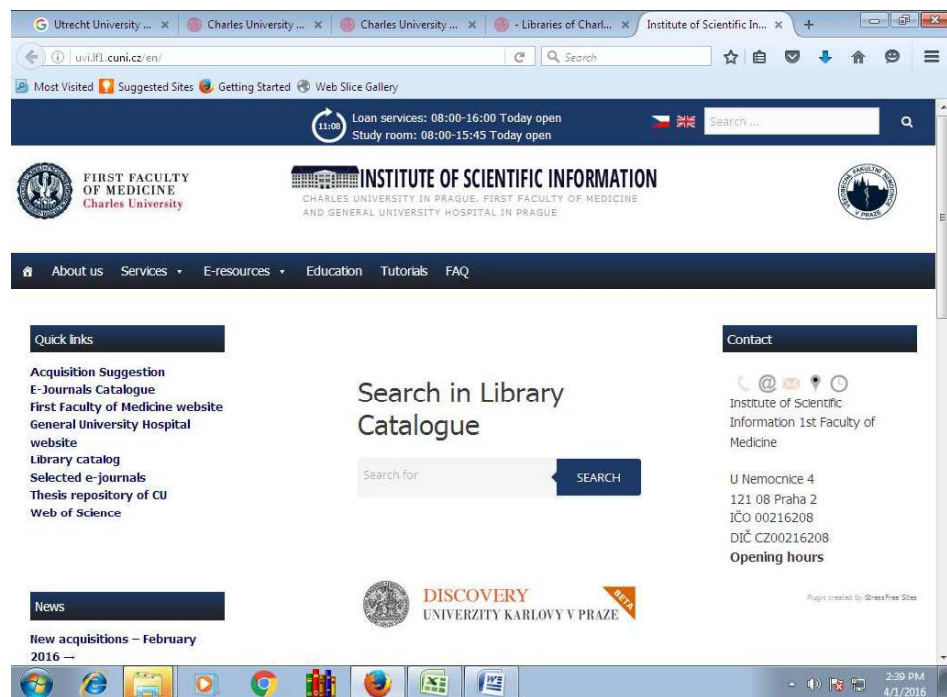
4.2.1.7. Access to web OPAC: One of the most important web based service university libraries are offering since 1990s is a web-based 'Online Public Access Catalogues' means web OPACs (Ramesh Babu & O'Brien, 2000). Using this OPAC of library resources users can search a library catalogue to locate books and other reading material remotely through the web. It is the most important service of any library; this provides a gateway to the library collection (Online public access catalog). Most popular web OPAC interfaces used in UK academic libraries are Talis, INNOPAC, WebCat, Voyager, GeoWeb and ALEPH (Ramesh Babu & O'Brien, 2000).

Screenshots 4.2 to 4.4 shows web OPACs of a few selected university libraries like the Puerto Rico, Charles and Jagiellonian Universities.

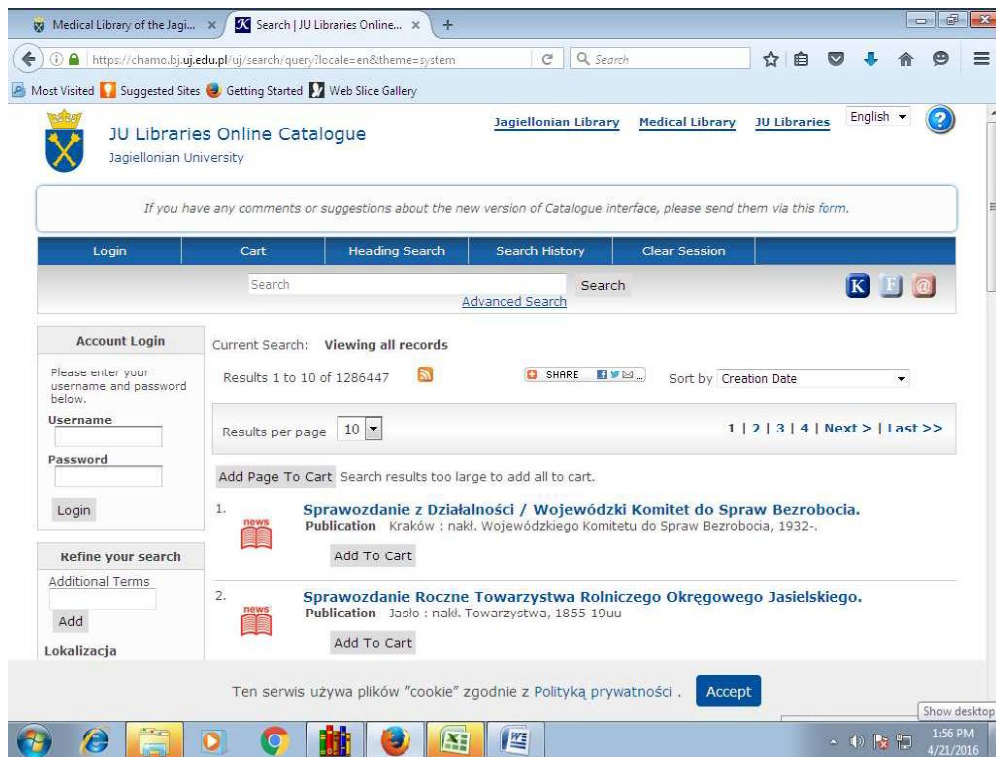
Screenshot 4.2: Web OPAC of the University of Puerto Rico library



Screenshot 4.3: Charles University library's online catalogue



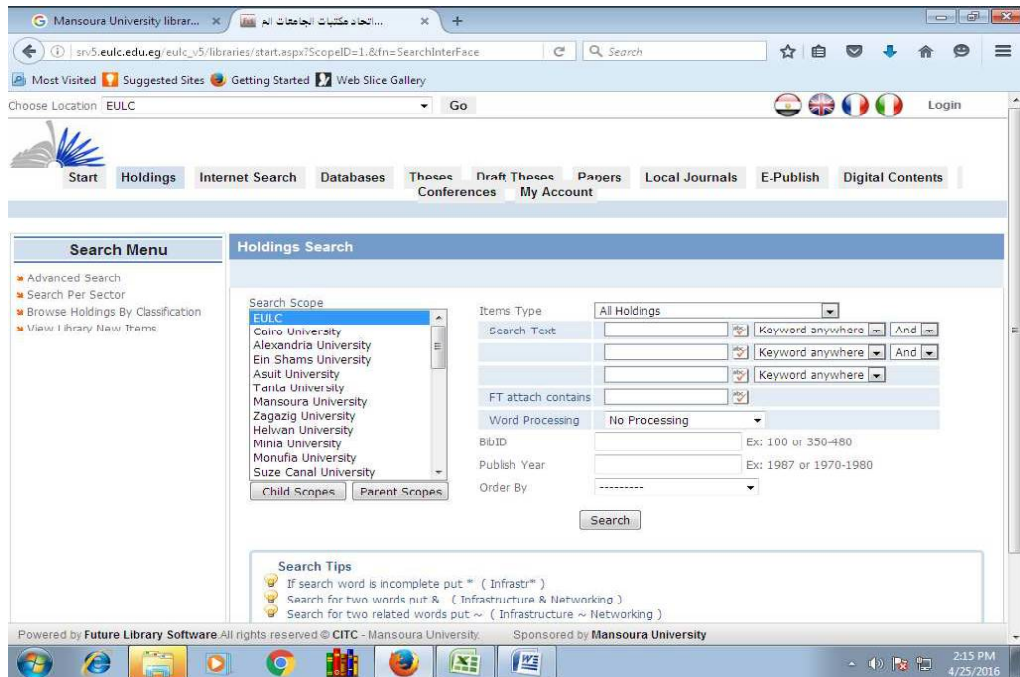
Screenshot 4.4: Jagiellonian University library's online catalogue



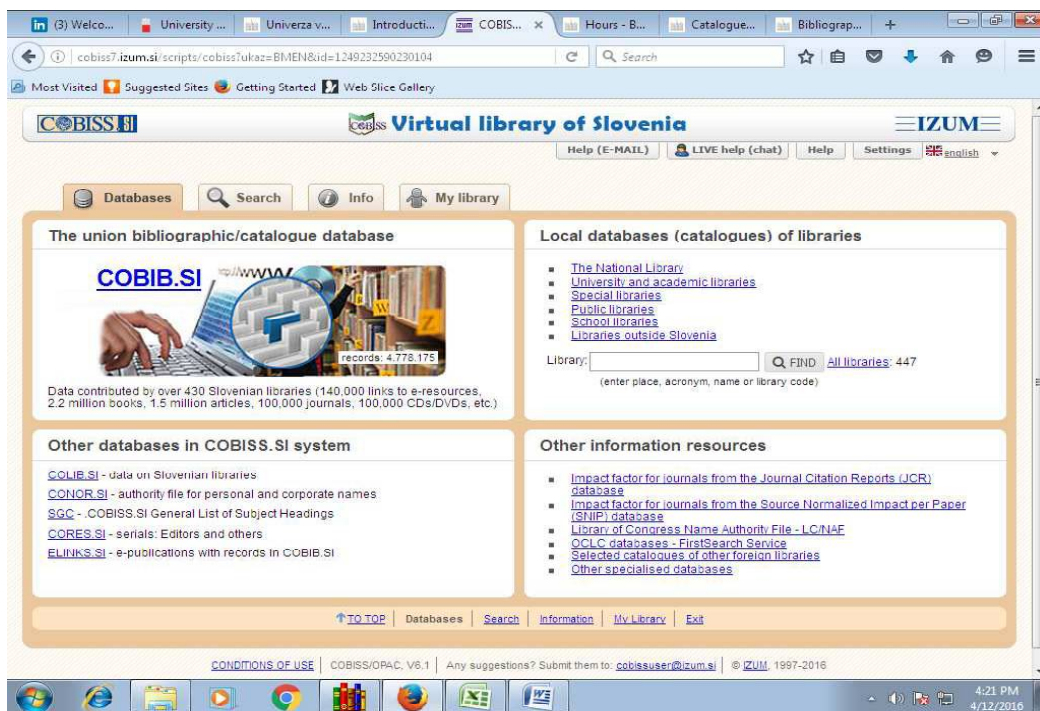
The union catalogue is a database of bibliographic records that are created, maintained and utilized by a group of Libraries (Union catalog). It is a combined library catalogues describing the collection of member libraries. The union catalogue concept was introduced and implemented long back. The largest print union catalogue was published is the American National Union Catalog (NUC) completed in 1981. With the introduction of computerization and library software this activity was suspended as creation of union catalogues in the form of digital databases has become very easy. OCLC's WorldCat is the world's largest network of library content and services. WorldCat libraries are dedicated to providing access to their resources on the Web, where most people start their search for information(What is WorldCat?). Not all libraries are able to provide Web OPAC to library resources, therefore, to provide Web OPAC to the library collection and to assist in locating and requesting materials from member libraries through inter library loan service many countries are providing such unique platform to all member libraries (Union catalog).

Below Screenshots 4.5 and Screenshot 4.6 are examples of sample university libraries in Egypt and Slovenian countries which are using a single platform for all member libraries for giving Web OPAC or E-Discovery service named EULC and COBIB.SI system.

Screenshot 4.5: Union catalogue of Egyptian Universities libraries



Screenshot 4.6: COBIB.SI union catalogue of Slovenian libraries

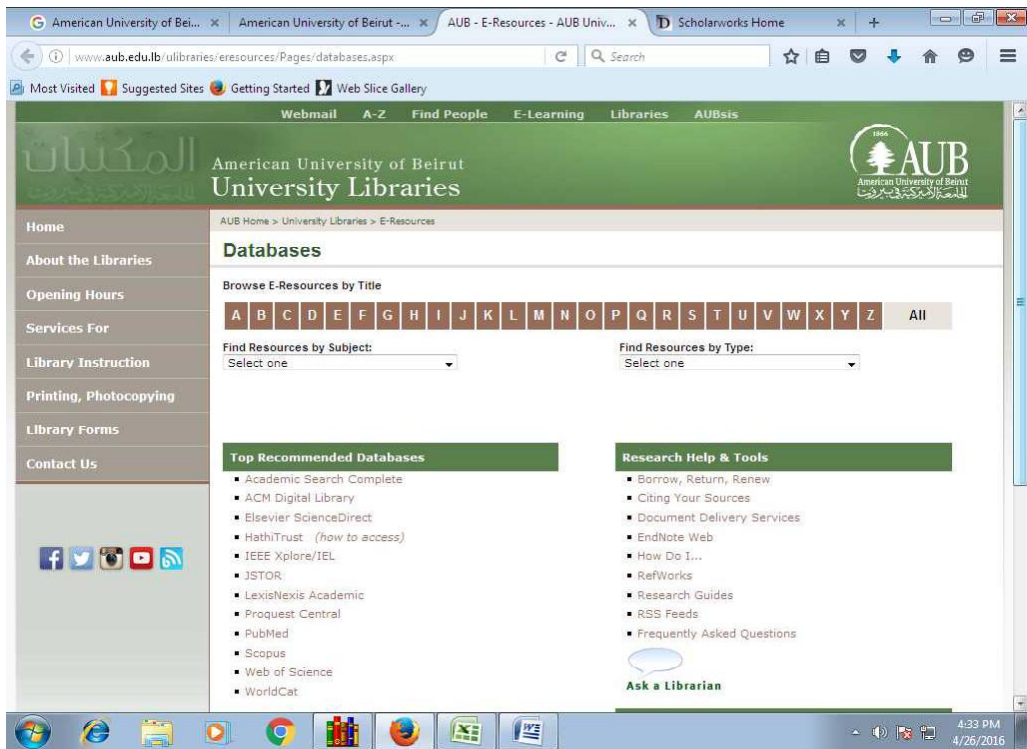


4.2.1.7. Access to Databases: In traditional university libraries the library databases were in the form of catalogues. Card catalogues were maintained by the libraries to make available information about the library material. With the use of technology, automation and digitization now all library records and digital resources are maintained in the form of databases and made available online to patrons through their website and that is why it is also one of the web based services investigator considered here. According to Webopedia, a database is a collection of information organized in such a way that a computer program can quickly select desired pieces of data (Database). It is a computerized system that makes it easy to search, select and store information. Databases are used in the library to keep track of library resources(What is a database?).

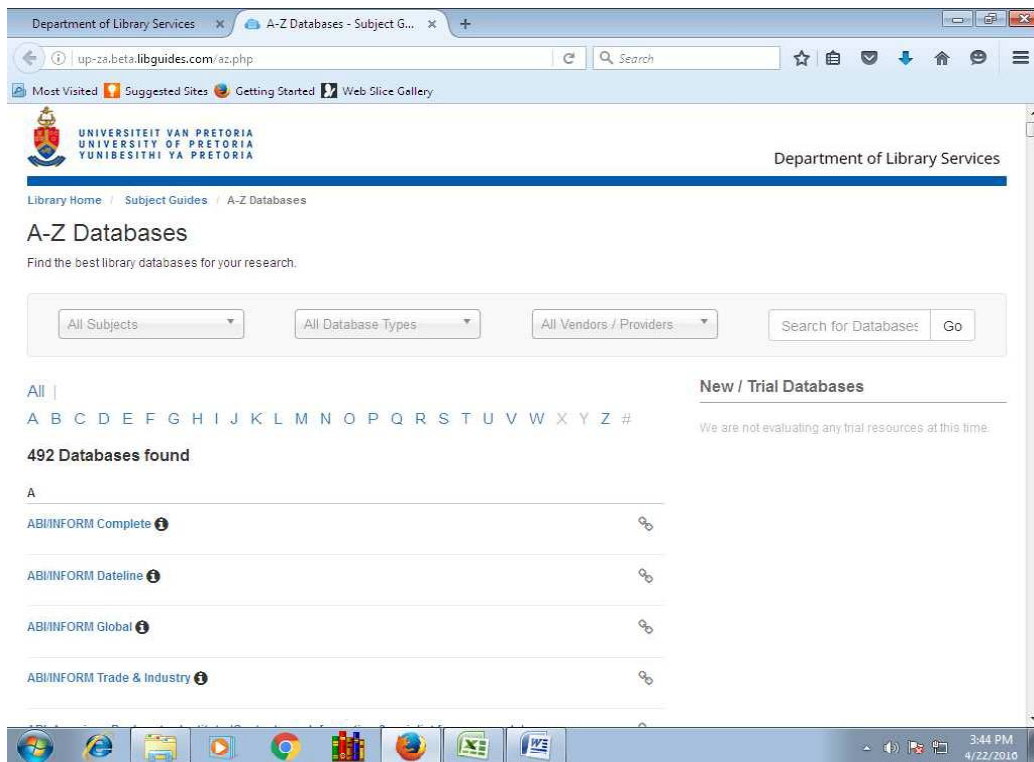
High Plains Library District (2016) a library database is both an electronic catalog and the access point to information. Library databases provide access to published information sources, both in print as well as electronic form. In libraries various types of databases are maintained and subscribed like e-books, e-journals, articles, newspapers, pictures, videos, manuscripts, thesis and dissertations and other resources. A few databases are subscribed (full text and/or abstract) and few are available freely and library provides access to both.

Here are a few examples of university libraries, giving access to different database via their website. Many libraries from selected universities are giving access to the databases they have subscribed and other free databases on their website. Commonly databases are arranged alphabetically or subject-wise on the library portal. Patrons can search through the databases under title, keyword, subject or author using federated search engine or e-discovery system or tool while few university libraries from different parts of the world including India not given such search facility. Few libraries not even given details of databases they are subscribing or available free of cost on their website. Few libraries do not subscribe online databases. Screenshots 4.7 to 4.9 are examples of university libraries providing access to databases.

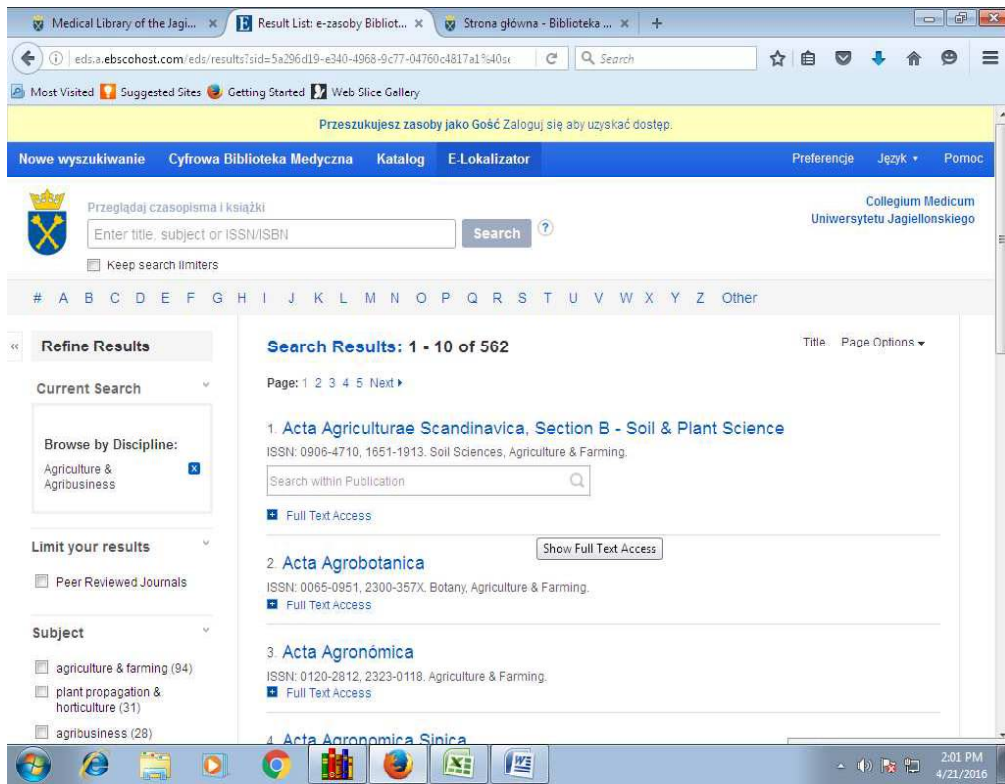
Screenshot 4.7: American University of Beirut providing access to databases



Screenshot 4.8: University of Pretoria providing access to databases



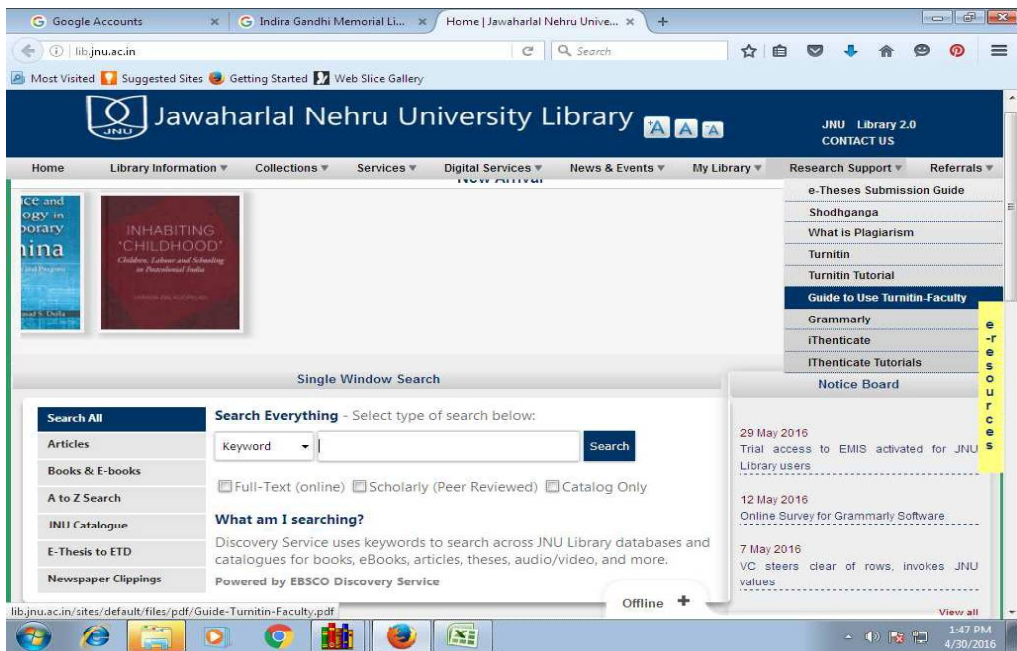
Screenshot 4.9: Jagiellonian University library providing access to databases



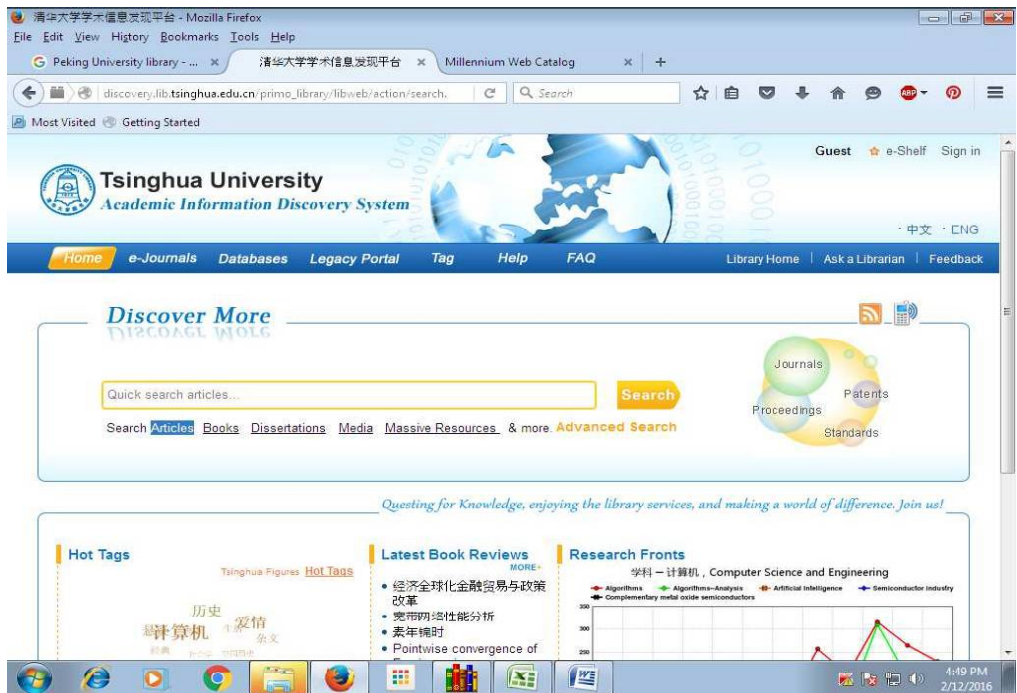
4.2.1.7. Federated Search/E-Information Discovery Tools: The university library portal contains multiple databases and federated search engine without aggregation at the metadata level. Federated search is an information retrieval technology to search resources from multiple search engines, databases by sending a single query request (Federated search). To maximize the value, usefulness and easy online access to all library resources both in-housed (catalogue or institutional repository), outsourced and free electronic full text scholarly databases many university libraries are using very powerful e-discovery tool (single window access) like Screenshot 4.10 EBSCO Discovery services (EDS), Google Scholar, FEDGATE, Mendeley, VuFind, UWLink, and other in-housed discovery tools, etc. As the cost of high quality e-discovery tools are very high in many countries to save cost all member libraries are using a single e-discovery system (Dhamdhare & Smet, 2015)

Few examples of e-discovery search service of the Jawaharlal Nehru University Library, Tsinghua University Library, and MelbourneUniversity Library are given below in the Screenshots 4.10 to 4.12.

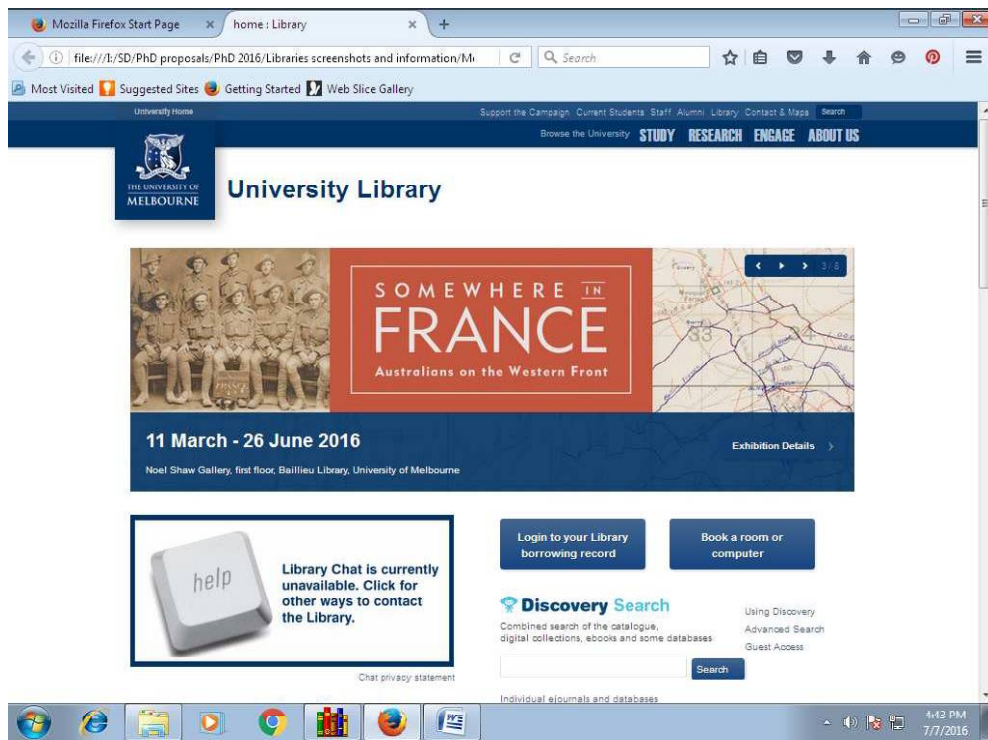
Screenshot 4.10: e-discovery tool of the Jawaharlal Nehru University Library



Screenshot 4.11: e-discovery tools of the Tsinghua University Library

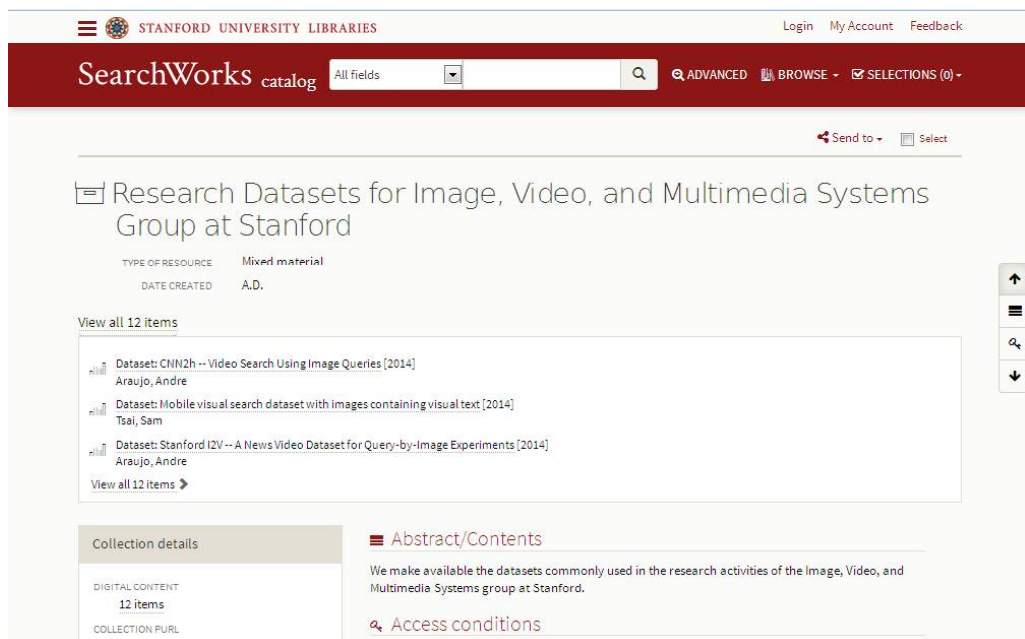


Screenshot 4.12: e-discovery tool of the Melbourne University library



4.2.1.7. Datasets: Datasets are nothing but collection of data. According to (Rouse, 2016) data set is a collection of related, discrete items of related data that may be accessed individually or in combination or managed as a whole entity. Dataset term was originated with IBM. In a database, a data set might contain a collection of business data like names, salaries, contact information, sales figures, etc. The database itself can be considered a data set, as data within it related to a particular type of information. Few of world's top traditional university libraries provide this service along with access to databases. According to Dhamdhere & De Smet (2015), datasets are made available by 14.28% of the USA Libraries but only 3.57% Indian Libraries. The Stanford University maintains datasets commonly used in the research activities of the image, video and multimedia system groups at Stanford and made them available. Screenshot 4.13 below shows the research datasets service of the Stanford University (Research Datasets for Image, Video, and Multimedia Systems Group at Stanford).

Screenshot 4.13: Stanford University Library's research datasets service



The Berkeley Library of California University (Screenshot 4.14) has a separate data lab for offering consultation services to researchers whose research topic involves numeric data, includes finding and recommends data sources and advises on technical data issues such as file format conversion, web scraping, and basic statistical software related online services.

Screenshot 4.14: Data lab of the Berkeley library



4.2.1.7. Access to Library Archives/Digital Collection/Institutional

Repository: This is another library web based service in which university library gives online access to collected and preserved archives or digital collection of intellectual (scientific and scholarly) output created within a university. It is also called as an institutional repository. It is a set of services to members of its community for the management and dissemination of digital material created by the institution and its community members. In the universities, repositories are mostly research output and in some cases all university records in digital form. University Institutional Repository contains digital assets generated by academics such as manuscripts, monographs, eprints of academic journal articles, university projects, test community, electronic thesis and dissertations, pictures, maps, projects, lectures, audio, video files, tutorials, interviews, newsletters, annual reports, speeches of guests, administrative documents, datasets, course notes, learning objects, conference proceedings or other special and rare collection(Institutional repository). All these repositories adhere to an internationally-agreed set of technical standards. They expose the metadata (the bibliographic details such as author names, institutional affiliation, and date, titles of the article, abstract and so forth) of each item in their contents on the Web in the same basic way. In other words, they are 'interoperable'. This common protocol to which they all adhere is called the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). The contents of all repositories are then indexed. The self-archiving process in which authors deposit their work in repositories grows the Open Access corpus will represent an increasingly large proportion of the scholarly literature (Open Scholarship).

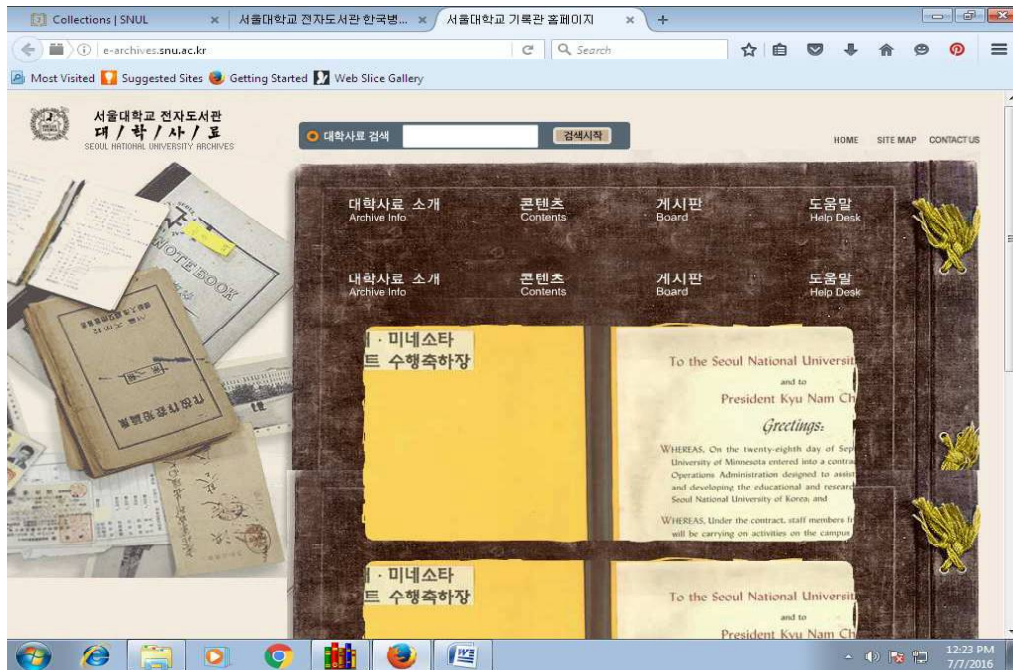
Some libraries have separate website or blog for such collection and link is given on the main library website. With new digital library software, it is possible to deposit material in an institutional repository and give easy online access. Many university libraries exhibit their special digital collection and made open for all. It is treasure of that university.

The main advantages of IR are it opens up the outputs of university to the world, maximizes the visibility and impact of those outputs as a result, collects, curates digital

outputs, manages and measures research and teaching activities, encourages collaborative projects and interdisciplinary research, facilitates sharing and development of digital teaching material (Open Scholarship).

Few examples of selected world university library archives, IRs, special collections from the sample are given in the Screenshots 4.15 to Screenshot 4.18.

Screenshot 4.15: An archive of the Seoul National University



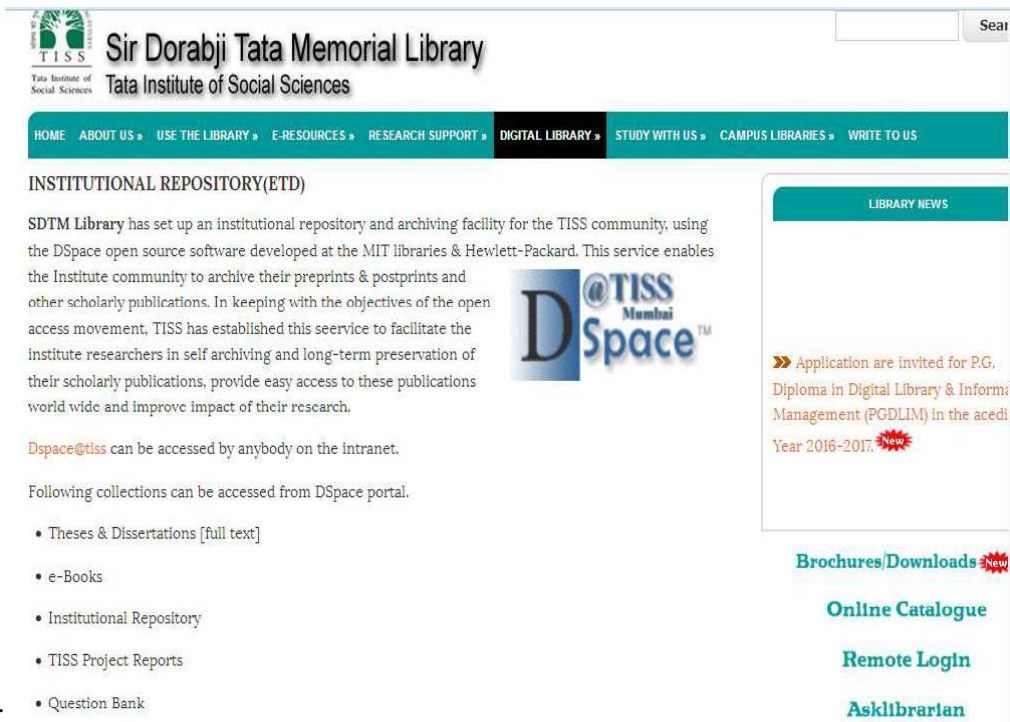
Screenshot 4.16: Digital repository of the University of Nairobi



Screenshot 4.17: Film archive of the Hebrew University of Jerusalem



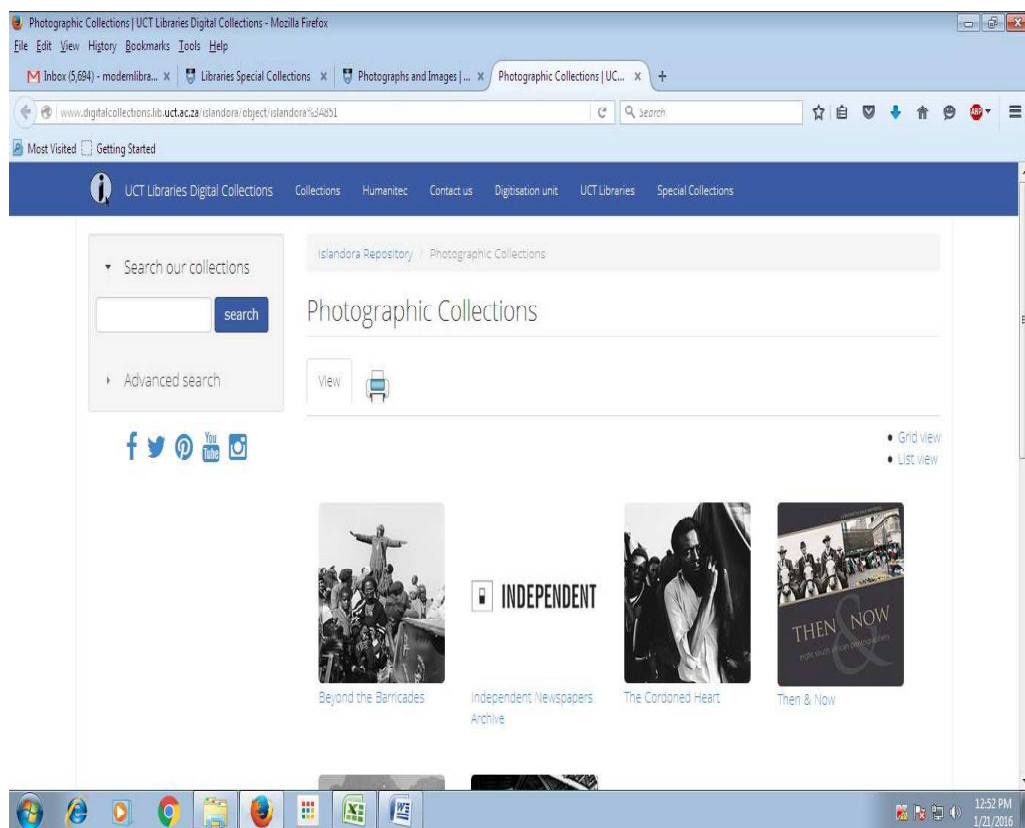
Screenshot 4.18: Institutional repository of Tata Institutes of Social Sciences library



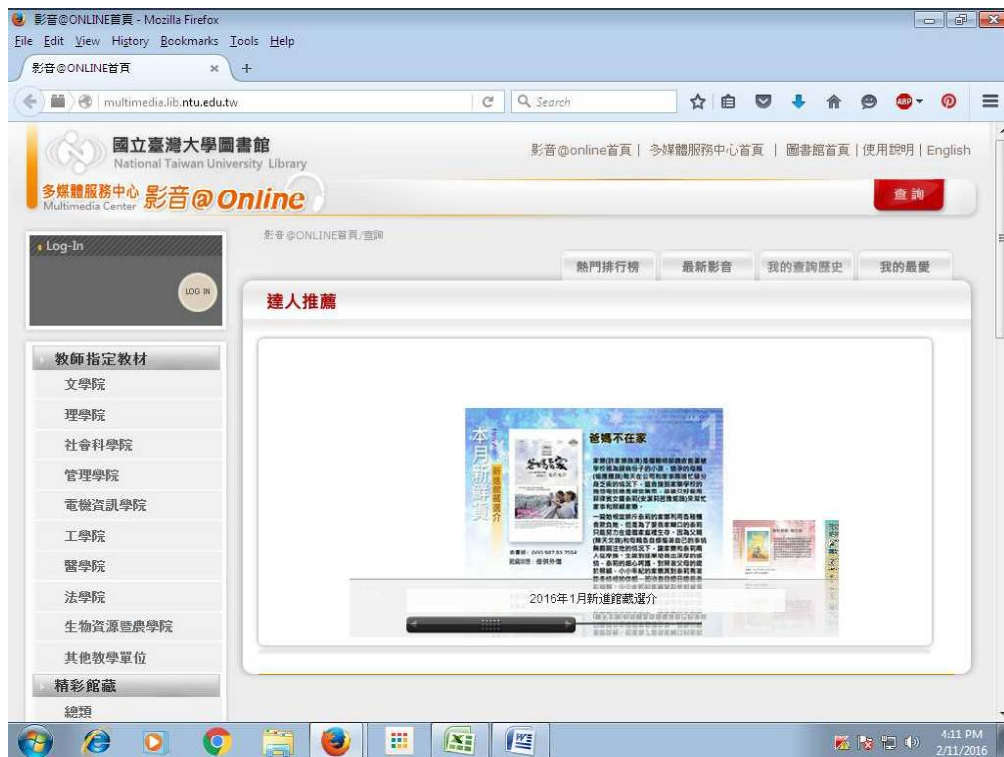
4.2.1.7. Access to Audio/Visual databases: The university libraries create or sometimes subscribe audiovisual/multimedia databases and gives online access to their patrons through library website using in-house or digital library software like Dspace, Drupal, Eprint, etc. This web based service is useful for patrons as they get access to these databases online and from anywhere they can refer these resources. Not all university libraries have multimedia databases or collection of videos, films, music, digital pictures, recordings, animations, graphics together with text data and gives online access.

Screenshots 4.19 to 2.21 of few prominent University libraries offering this web based service to their patrons are given here. University of Cape Town has given access to its photographic collection/archive (Screenshot 4.19); National Taiwan University library has its multimedia collection (Screenshot 4.20) whereas example of Steven Spielberg Jewish film archive given in Screenshot 4.21.

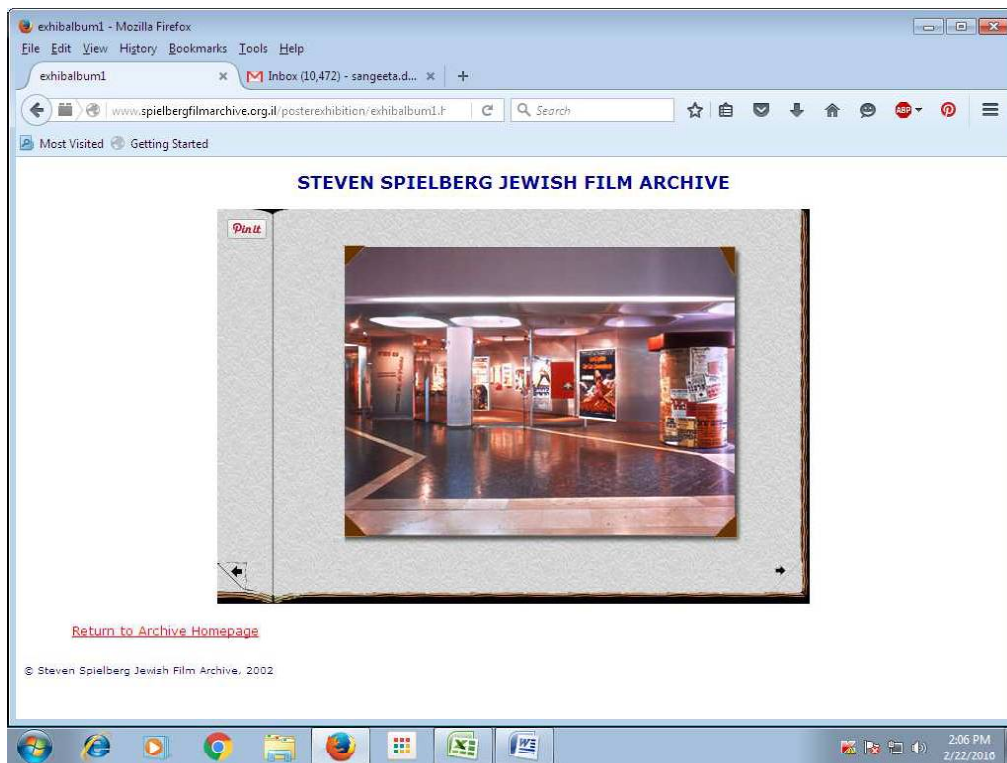
Screenshot 4.19: Photographic collection of the University of Cape Town



Screenshot 4.20: Multimedia collection of the National Taiwan University library

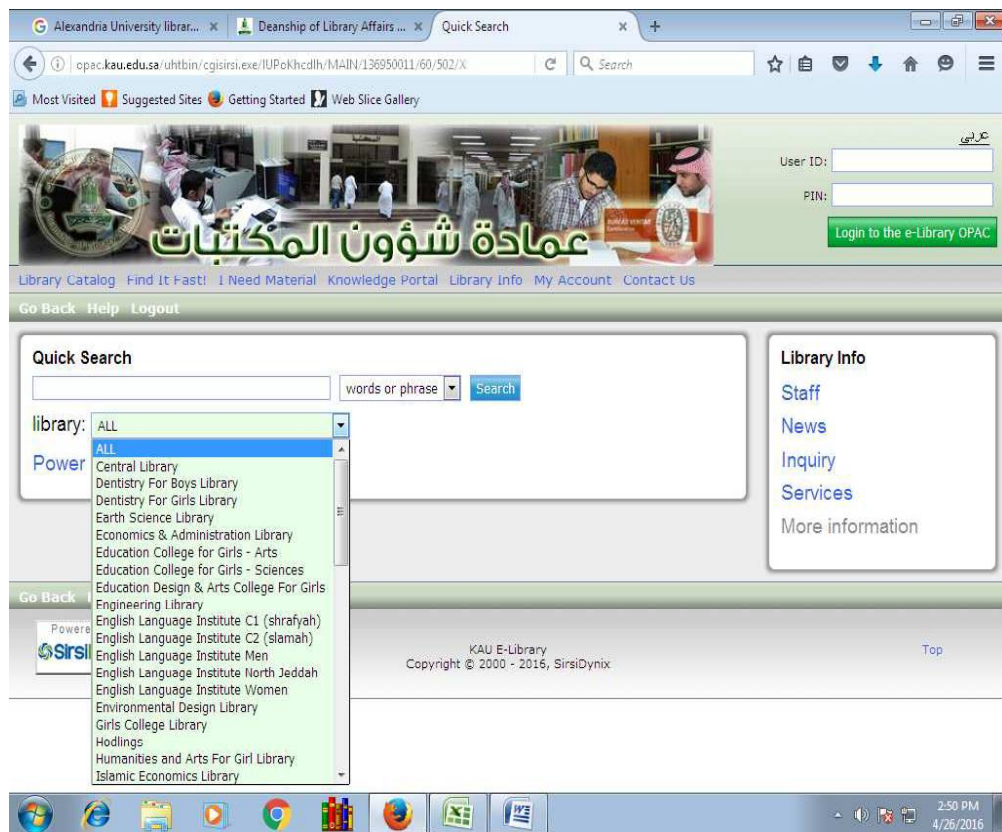


Screenshot 4.21: Steven Spielberg Jewish film archive

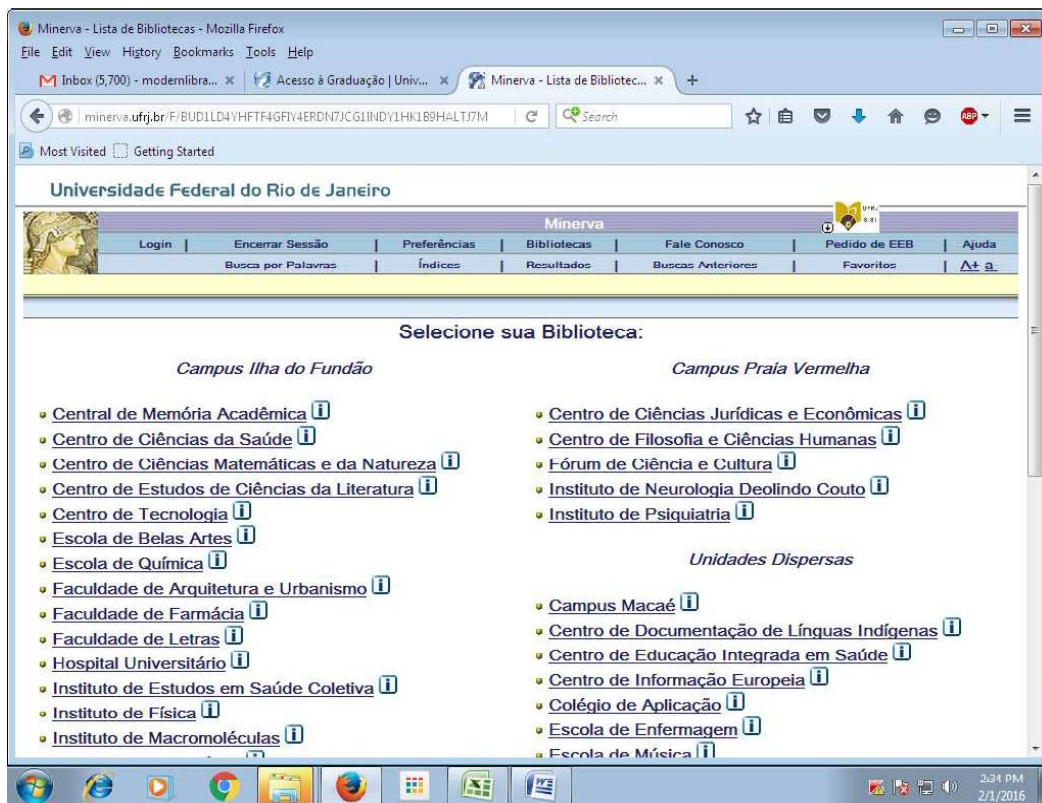


Find a Library: Many top World University Libraries are collection of libraries. Department or regional libraries are managed centrally and access to their collection, catalogues and websites are given in the central university library. Because of this central access, member libraries get the benefit of resource sharing and inter library loan facility. This ‘find a library’ web based library features provides access to other sub-libraries. Sometimes all sub-library catalogues are common, but managed separately. Few University libraries give a list of libraries and their links. One can search the library from search box too. Screenshot 4.22 and 4.23 shows this service at the King Abdul Aziz University libraries and the Universidad Federal do Rio de Janeiro.

Screenshot 4.22: Quick search of King Abdul Aziz university libraries



Screenshot 4.23: Find a library service by Universidad Federal do Rio de Janeiro



4.2.1.8. Off campus access: Traditional university libraries all over the world give access to resources online. Researchers and teachers can access the electronic information resources like e-books, e-journals, articles and special databases of the library from anywhere in the world using EZproxy system. Users are automatically directed to the *EZProxy* log-in screen. Login and passwords are provided to the users to off campus access to library resources. This web based service is need of time and techno savvy patrons.

Screenshot 4.24 to 4.26 gives examples of Devi Ahilya Vishwa Vidyalaya, India ; Utrecht University library and Alma Jordan library providing off campus access.

Screenshot 4.24: Off-campus access service of Devi Ahilya Vishwavidyalaya

The screenshot shows a Mozilla Firefox browser window displaying the website for Devi Ahilya Vishwavidyalaya. The page header includes the university's name and logo, along with its accreditation: "(Formerly University of Indore), NAAC 'A' Grade, State University of Madhya Pradesh, India". Below the header, the text "Remote Access to E-Resources" is displayed, followed by a note: "[For Devi Ahilya Vishwavidyalaya off-campus members only]". A large image of the university's entrance gate is shown, with a login form overlaid on the right side. The form has fields for "Username:" and "Password:", and a "Login" button. Below the image, a "Kindly Note:" section contains a list of bullet points:

- Access to off campus e-resources is restricted to Devi Ahilya Vishwavidyalaya only, which will be monitored regularly.
- User name and Password will be issued by Devi Ahilya Vishwavidyalaya Library.
- Users should not share their user name and password.
- Unauthorized usage, multiple logon is not allowed, if found will lead to blocking the access to e-resources.
- For any clarifications or query please contact the Library at [Librarian](#)

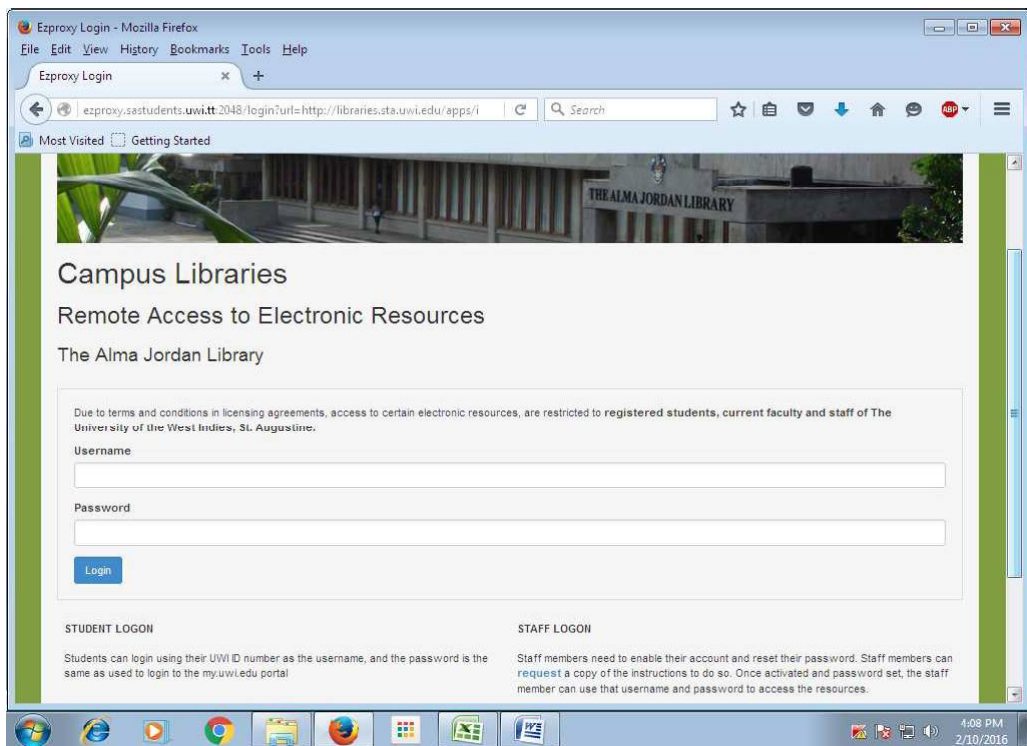
Screenshot 4.25: Off-campus access service by the Utrecht University library

The screenshot shows a browser window displaying the Utrecht University Library website. The page title is "Utrecht University Library" and the URL is "libguides.library.uu.nl/getaccess_en". The main heading is "Get access (login from home): Login with your Solis ID". Below this, a sub-heading reads: "Various methods of off-campus access to search engines, e-books and electronic journals of Utrecht University Library". There are several tabs: "Login with your Solis ID", "Who has access?", "Which method should I choose?", "More possibilities", "UBUlink", and "VPN". The "Login with your Solis ID" tab is selected. The page is divided into three main sections:

- Direct login:** Explains that staff and students have off-campus access and provides a "Direct login" link.
- Login from home:** Explains that this gives access to all electronic publications and search engines for the duration of the browser session.
- Use the library website:** Provides instructions on how to start at the Utrecht University library homepage.

 Additionally, there are sections for "Create a bookmarklet in your browser" and "The bookmarklet at a glance". The "Create a bookmarklet" section includes a "Get access" button and instructions on how to add the bookmarklet to the browser. The "The bookmarklet at a glance" section shows a visual representation of the bookmarklet.

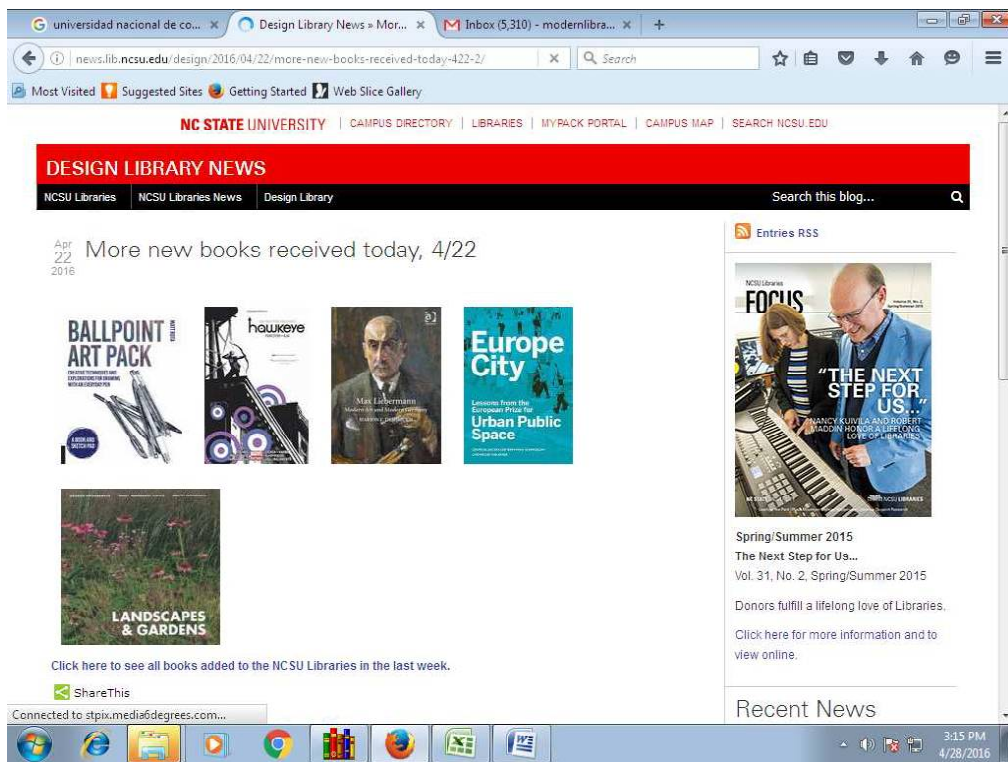
Screenshot 4.26: Off campus access of the Alma Jordan Library



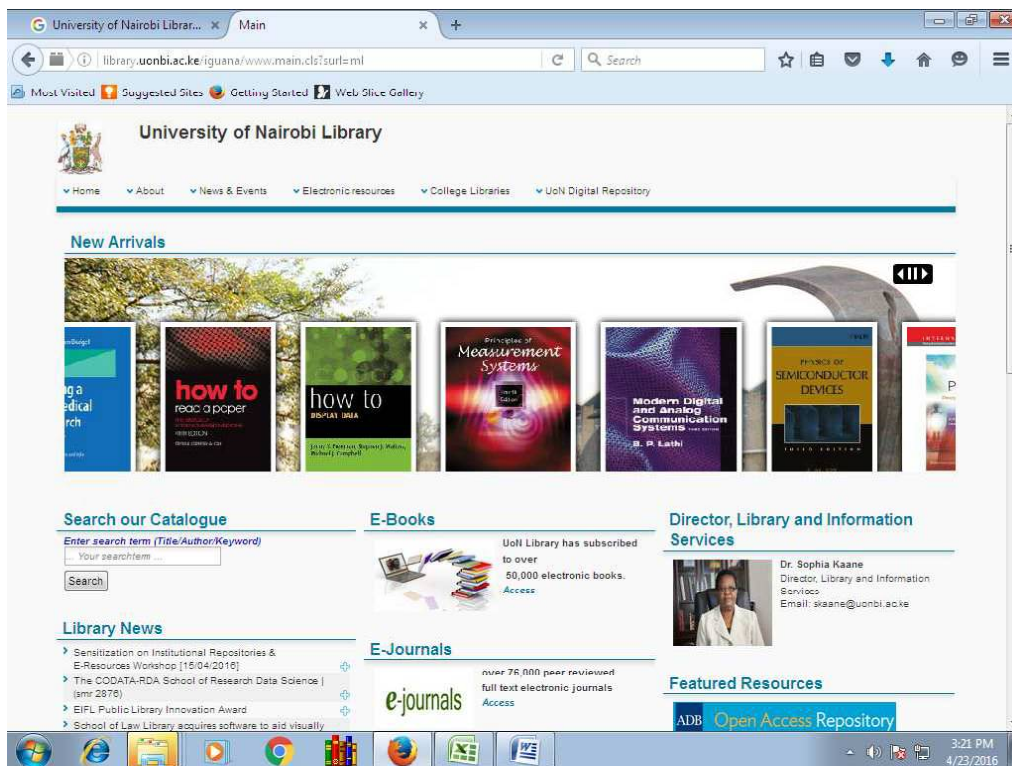
4.2.1.9. New Arrivals: Notification of new arrivals has been a current awareness service offered by all types of libraries since long time. In which list of new arrivals or new addition in library collection is communicated to the patron weekly, monthly, bimonthly, quarterly, etc. Using library automation softwares and digital library softwares it has become very easy to share latest updates to patrons daily also. Most of the softwares have provision to automatically prepare a list and share on the platform assigned. University libraries are providing these services via email, blog, website, and other web tools.

In below screenshots 4.27 to 4.29 of new arrival services, cover pages of books are provided along with bibliographical information by few university libraries to attract readers, few libraries like University of Nairobi and Tel Aviv University displays all new arrivals including e-books, journals, databases, CDs/DVDs and other reading materials on their website or blog. Taiwan University library shares these new arrivals on Facebook and other social networks too like Google+.

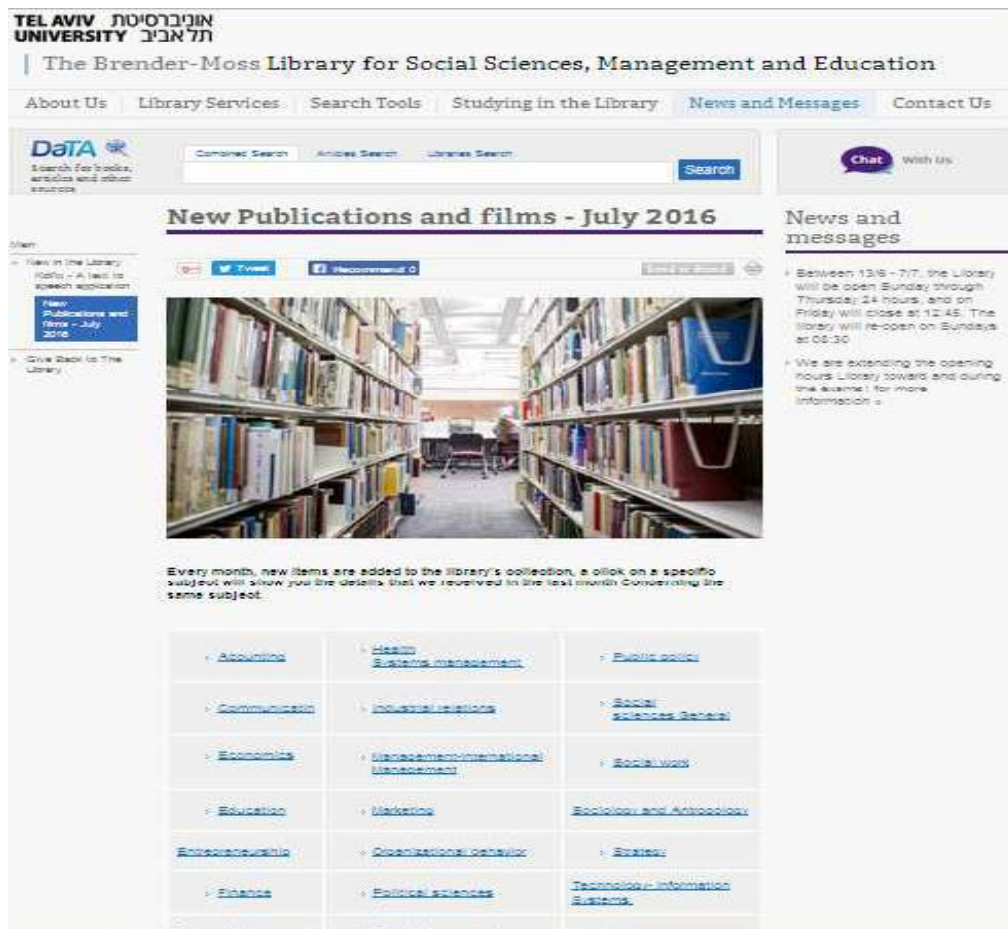
Screenshot 4.27: New arrival service on NCSU libraries website



Screenshot 4.28: New arrivals online displays of the University of Nairobi library



Screenshot 4.29: Monthly new arrivals services by the Tel Aviv University library



4.2.1.7. Inter Library Loan: The inter library loan facility is started for resource sharing purpose in libraries. No library in the world is rich with all books, journals and other reading material required by users. In that case a library gives facility to request the required material from the libraries where it is available and make it available to users. Now, because of digitization it has become very easy to get the required material in electronic form too. Now university libraries provide this facility online to their patrons.

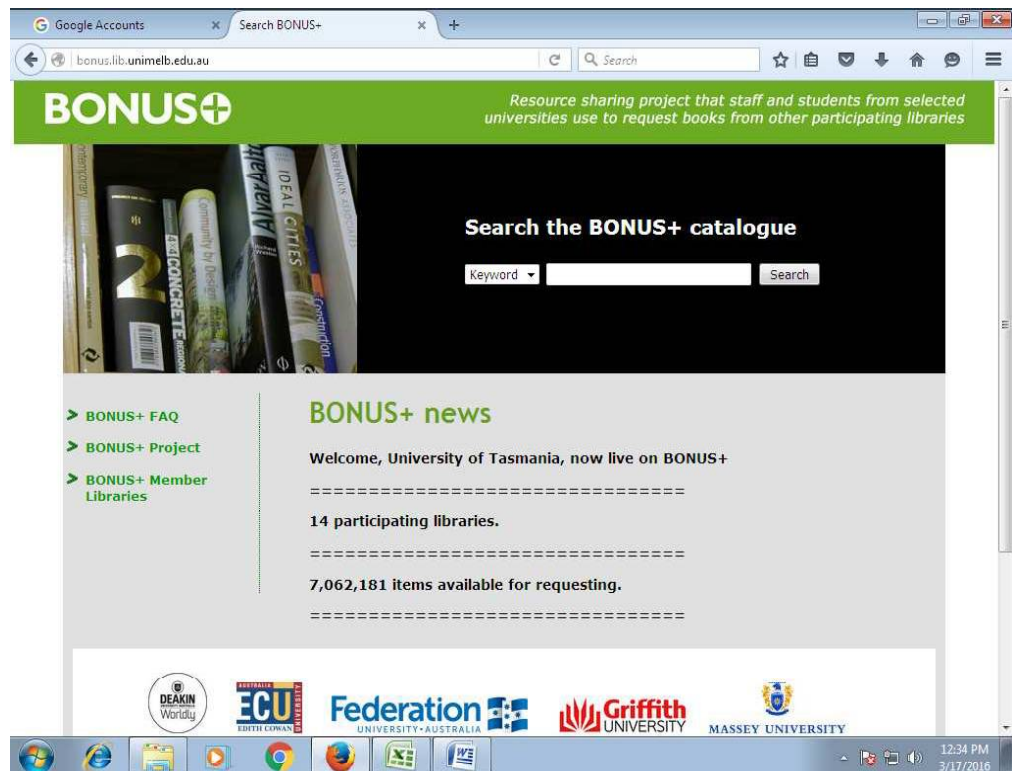
Few universities give information about inter library loan, the process, which material is available for loan, etc. on their website. Few libraries provide a Google form or PDF forms or word file or request form on the website or invites query via emails. Few universities provide guides, FAQs, manuals for accessing this web based service as well. In many countries union catalogue or consortia helps to give inter library loan facility to member libraries as they can easily locate the resources through union catalogue.

Examples of ILL services of few universities are given here in the form of screenshots 4.30 to 4.32.

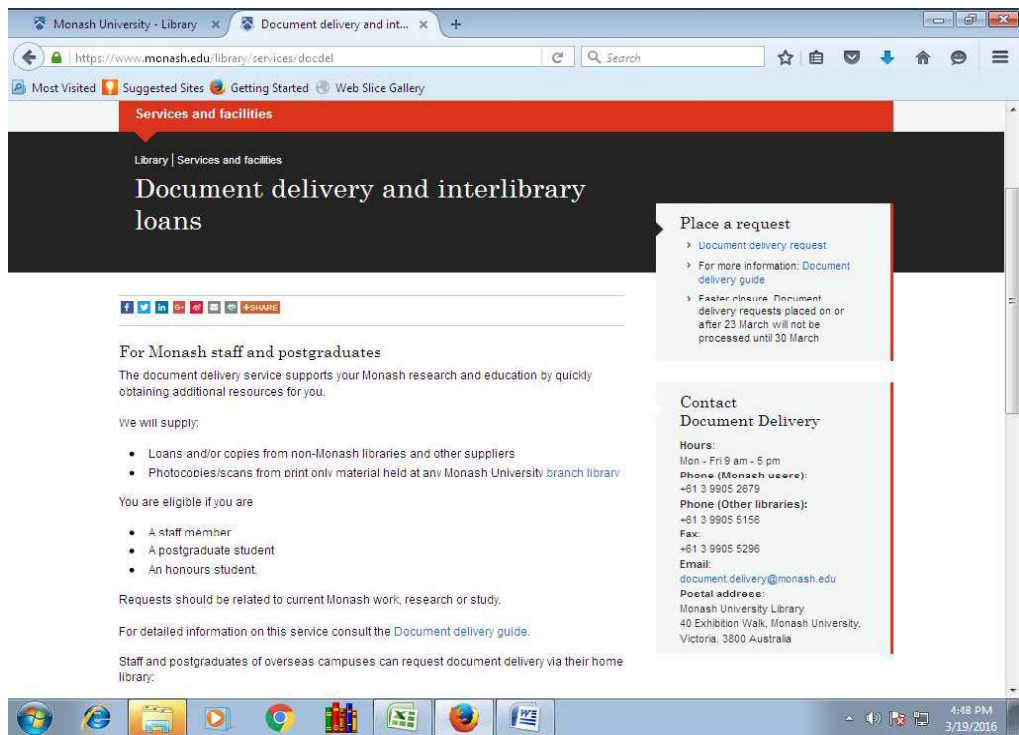
Screenshot 4.30: ILL service by the Tel Aviv University library



Screenshot 4.31: ILL service of the University of Melbourne library



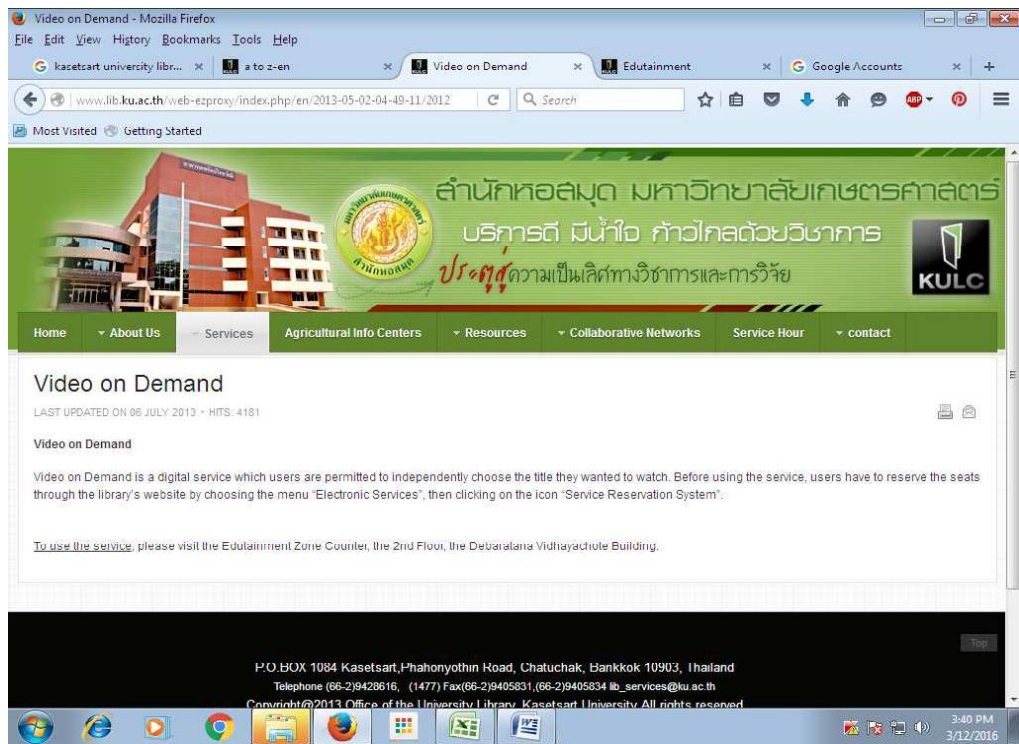
Screenshot 4.32: ILL service of the Monash University library



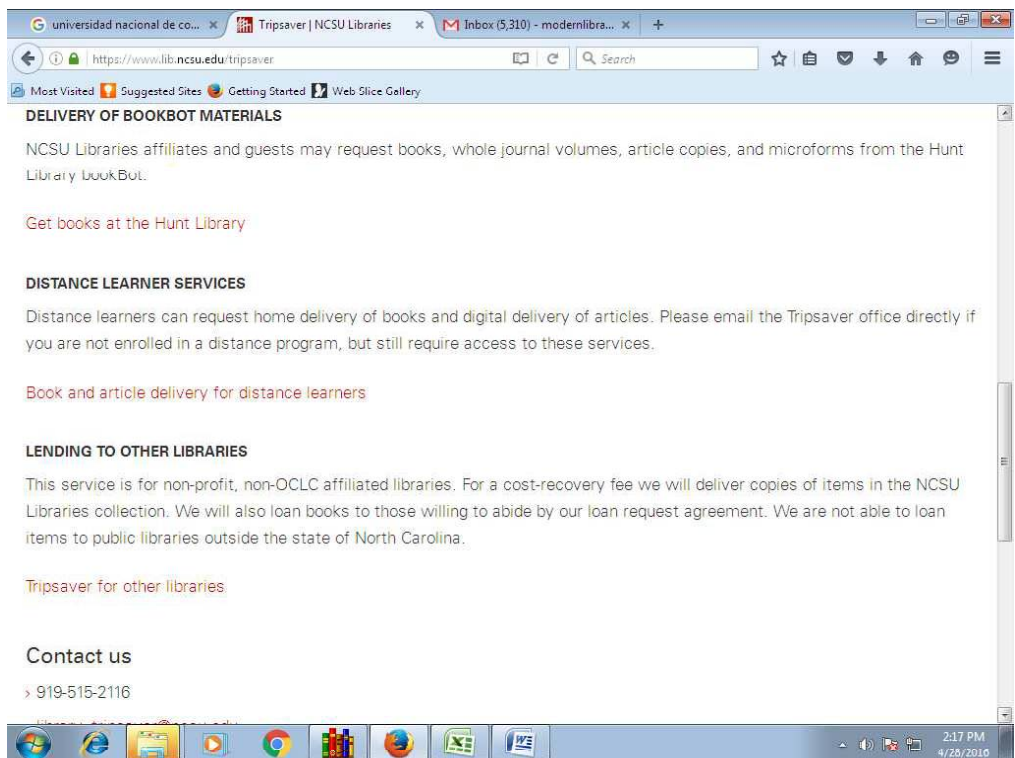
4.2.1.7. e-Document Delivery Service: It is also called digital service university libraries are providing for delivering documents on demand. In traditional libraries in inter library loan only print documents were delivered, but now web technology enabled to deliver documents in electronic forms too. One more reason for providing e-document delivery is now university library has its collection in digital form like articles, ebooks, audios, videos etc.

Screenshot 4.33 shows video on demand service and Screenshot 4.34 and 4.35 shows electronic delivery service of journal articles, chapters and other e-documents.

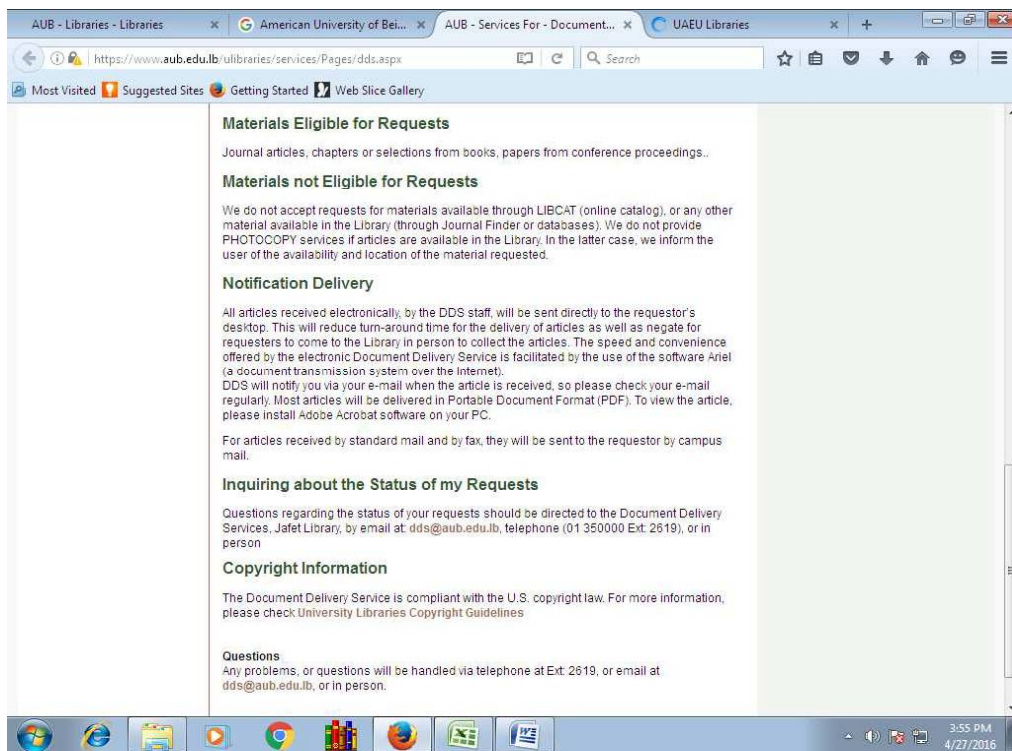
Screenshot 4.33: e-document service of the Kasetsart University library



Screenshot 4.34 e-document delivery service of NCSU libraries



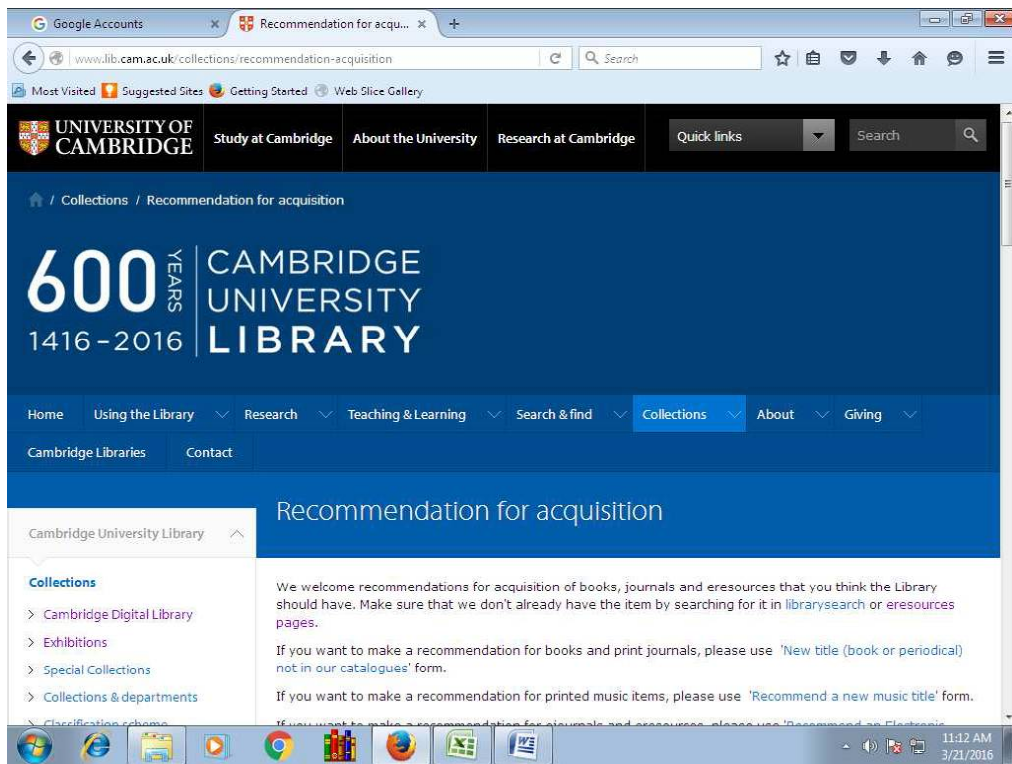
Screenshot 4.35: e-document delivery service of American University of Beirut



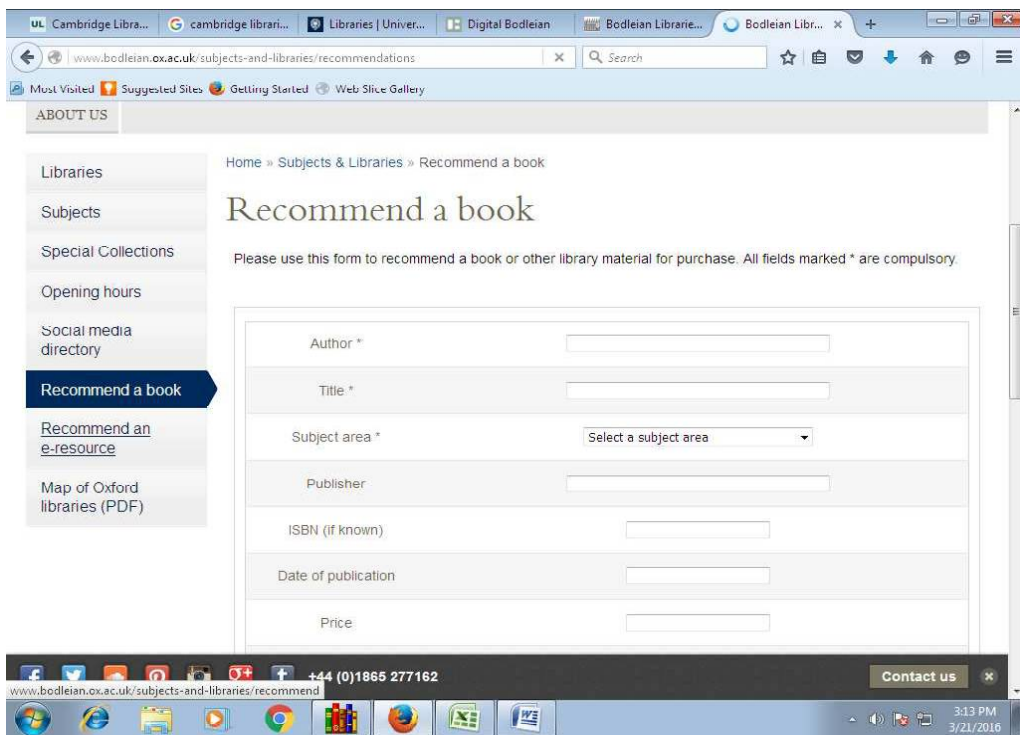
4.2.1.7. Books Recommendations: Many university libraries provide facility to recommend books and other reading materials like journals, CDs/DVDs, etc. online uses Google form, email or other web platforms. Few universities provide links to publishers or online book shopping sites where users can select the books and recommend to the library. This web-based service saves time of patrons and also helps to enrich the collection. Few universities like Cambridge University recommends patrons to go through the online catalogue and check availability of reading material before sending purchase request. Online requisition forms are made available to patrons to fill up.

Examples of Cambridge, Oxford and UAE University libraries are given in screenshots 4.36, 4.37 and 4.38.

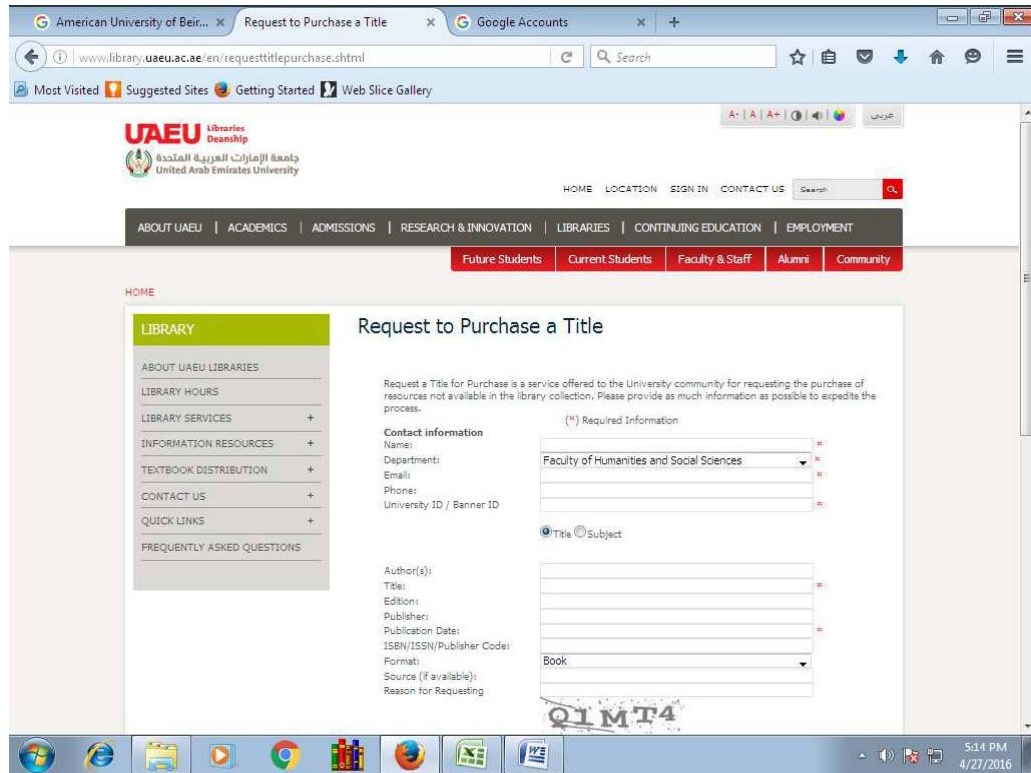
Screenshot 4.36: Online book recommendation service of Cambridge University



Screenshot 4.37: Online book recommendation service of Bodleian Libraries



Screenshot 4.38: Online book recommendation service of United Arab Emirates University



4.2.2. WEB-BASED PATRON EDUCATION TOOLS: In this cluster the investigator has included all the web based services and tools including social networking sites and other web 2.0 tools used by selecting university libraries for educating and giving instructions to the patrons. With the introduction of new softwares, resources (print as well as online) in libraries easy access to the internet to all patrons within campus or outside campus, there is a need to educate patrons how to locate the resources and how to search the resources. Sometimes, libraries provide many services and facilities, but patrons are not aware about that. So, along with personal training it is need of time to educate patrons online as many distance learning programs are run by universities, open education concept is coming forward. In developed country libraries there are special staff for educating patrons online using different tools and platforms, but in Indian university libraries no such separate posts are appointed. Let us discuss how these tools by these libraries to educate and update patrons. It is observed that, compared to other country's libraries in India the more widely used tools for patron education in the

selected libraries are Notification of new arrivals, photo gallery, news, upcoming events, ask us, Service Directory, Tips for access and use the library resources, tools for discovery, help guides, Map directions, feedbacks, Email, etc. along with other some of the above listed.

4.2.2.1. News and Upcoming Events: This section of the university library website offers web-based notification of latest library news and list of events library is planning to organize in coming future. Library news can be related to new arrivals in the library collection, events organized, their photos, comments, workshops held, new services, facilities, and other day to day notices library displays on library notice board but in digital form. University libraries conduct many events in collaboration with different departments, publishers, orientation programs, information literacy programs, workshops, conferences, etc. and these events are communicated in advance to the patrons or stakeholders. All news and upcoming events are organized chronologically. Latest news and updates are listed at the top and old news and updates are preserved in archives. Examples of ANU, Nairobi and Oxford University’s Bodlien libraries are given in below Screenshots 4.39, 4.40 and 4.41.

Screenshot 4.39: News and events service of the Australian National University library

The screenshot displays a library website interface with the following sections:

- News »**
 - 26 Feb: Australian ORCID Consortium launched
 - 28 Jan: ANU Press publishers & contributors honoured in Australia Day Awards
 - 15 Dec: Alumni access given to ANU Library services
 - 30 Nov: ANU opens Australia's first Taiwan Resource Centre for Chinese Studies
 - 02 Nov: Extended opening hours in Chifley during exam period
 - 23 Oct: Open data a key talking point during International Open Access week at ANU
- Events & exhibitions »**
 - 23 Mar 2018: Free ORCID sign-up session
 - 31 Mar 2018: Exhibition: High Street Dreams —shops and shopping in the early days
 - 20 Apr 2018: Free ORCID sign-up session
 - 18 May 2018: Free ORCID sign-up session
- Library information**
 - Borrowing
 - Branches
 - My library record
 - New titles
 - Subject guides
 - Tours & information sessions
- Contact us**
 - Subject contacts
 - Branch contacts
 - Key Library personnel
- Connect with us**
 - Facebook
 - Twitter

Responsible Officer: University Librarian / Page Contact: Library Systems & Web Coordinator

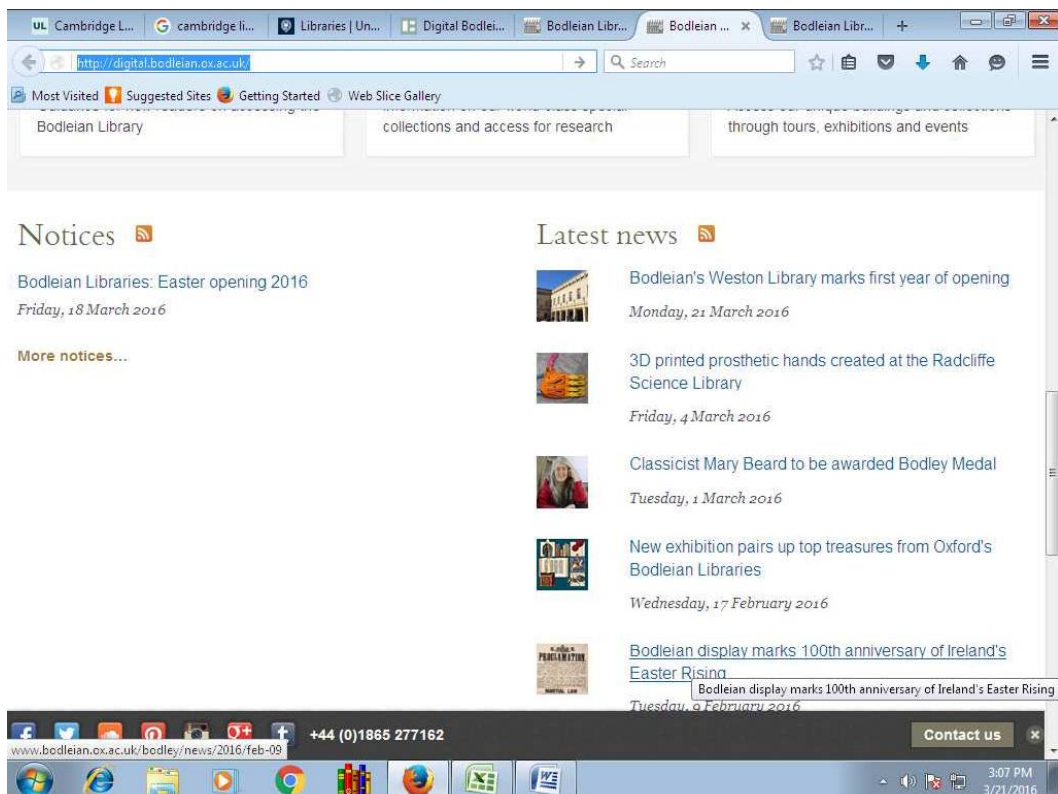
The footer contains the following information:

- Contact ANU: +61 2 6125 5111
- Copyright: The Australian National University, Canberra
- Disclaimer: CRICOS Provider : 001 200
- Privacy: ABN : 52 234 063 906
- Logos: edX, APRU, IARU, GROUP OF EIGHT AUSTRALIA MEMBER

Screenshot 4.40: News and events service of the University of Nairobi library



Screenshot 4.41: News and events service of Bodleian libraries



4.2.2.2. Weblog: A weblog is an online tool being effectively used by various university libraries in reaching their patron online, to bring their users behind the scene to meet staff, introduce with past and present activities and put them in front of row of events and market their services. The library creates blogs for offering various services like current awareness services about general books, book reviews, selective dissemination information, promoting library services and events, supporting users, highlighting library news, information and resources of interest, preparing subject guides, update new resources, collecting user's feedback or comments, engage community, publishing library newsletter, using as reference desk or library consortia. All posts are organized in reverse chronological order (Dhande, 2014) and users can comment on posts they read. A great library blog requires three ingredients: inspiration, motivation and dedication (Solanki & John, 2015). The usage of blogs is on higher side among all other web 2.0 applications.

Few University libraries created blog to update their users on the opening hours, calendar of events, to promote their services, to introduce their liaison librarians, for posting book reviews, events, notifications and library updates or to create official website(Awang, 2012).

Screenshot 4.42 and 4.43 are university library blogs maintained for archives, For instance, the Universiti Sains Malaysia library (USM) and Universiti Sains Islam Malaysia (USIM) library has created a blog to provide news and events.

Screenshot 4.42: The blog of Universidade Federal do Rio Grande do Sul library

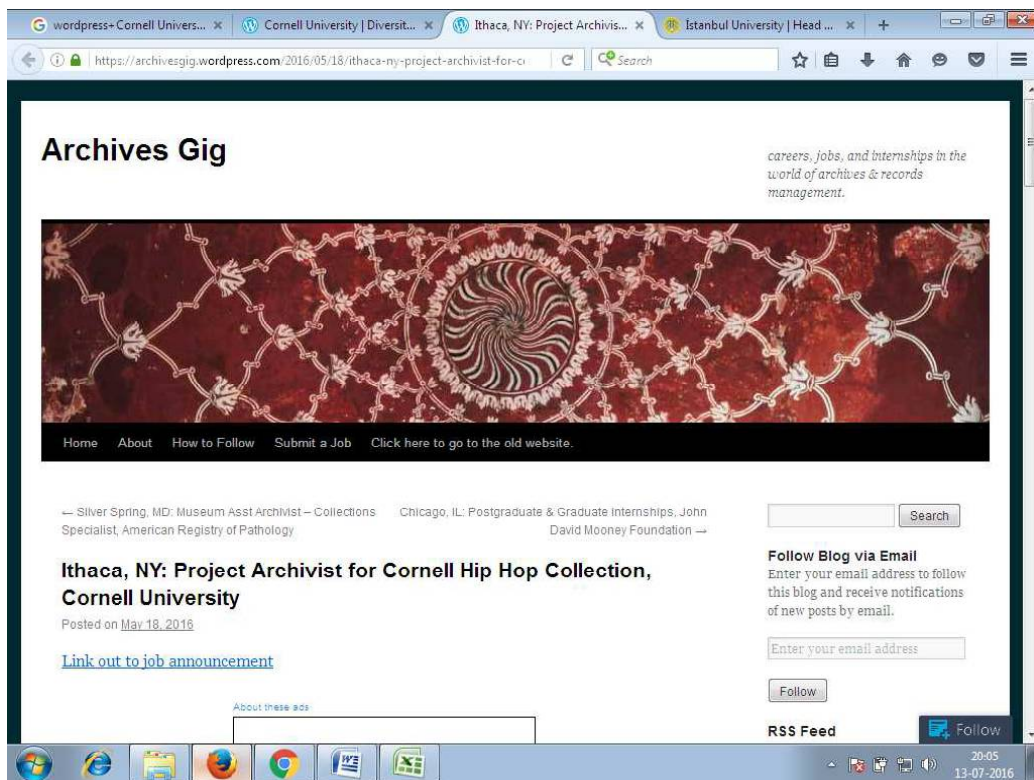


Screenshot 4.43: The blogs of University College London libraries

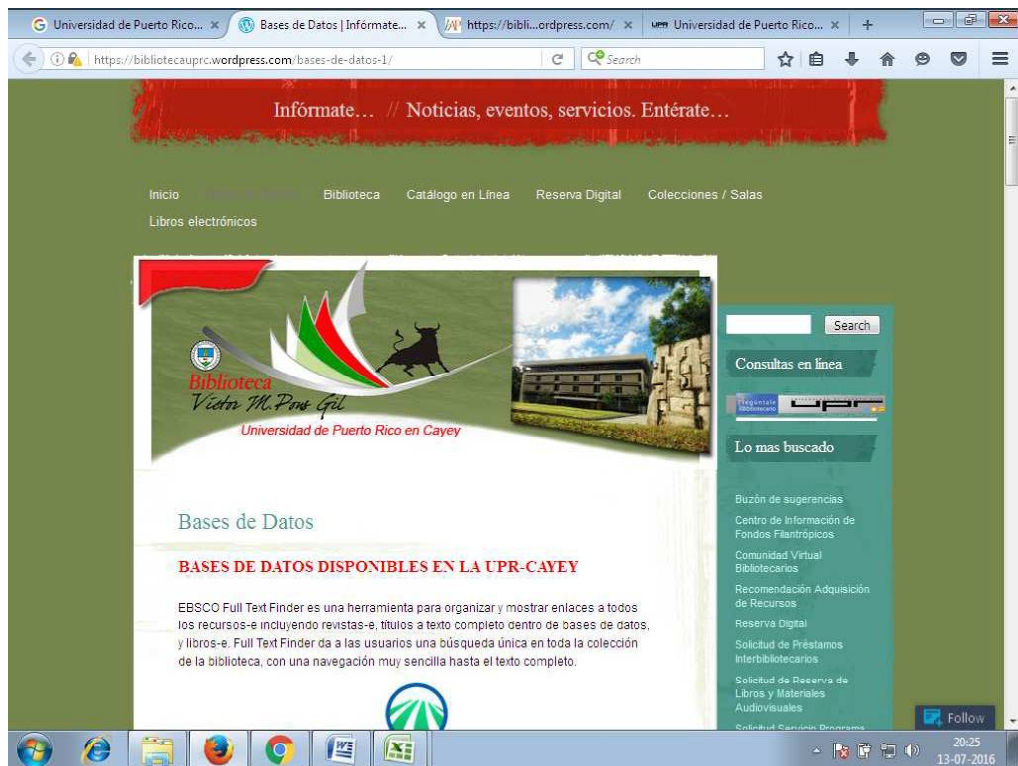


4.2.2.3. WordPress: WordPress is one of the excellent blogging platforms. It is flexible, easy to use, interactive, simple to use and customizable and therefore, since its inception in 2003 thousands of universities using WordPress for the official sites (Joyce, 2013). In university libraries also it has increasingly gained popularity as a content management system (Singley, 2013). Few university libraries use WordPress to build official websites too which includes rich contents and WordPress fully supports and meets the requirements like displaying multimedia, integrates static with animated content. It offers a perfect channel to maintain and expand collaboration. In publishing news, information, newsletters, updates university libraries use WordPress.

Screenshot 4.44: Use of WordPress at the Cornell University library

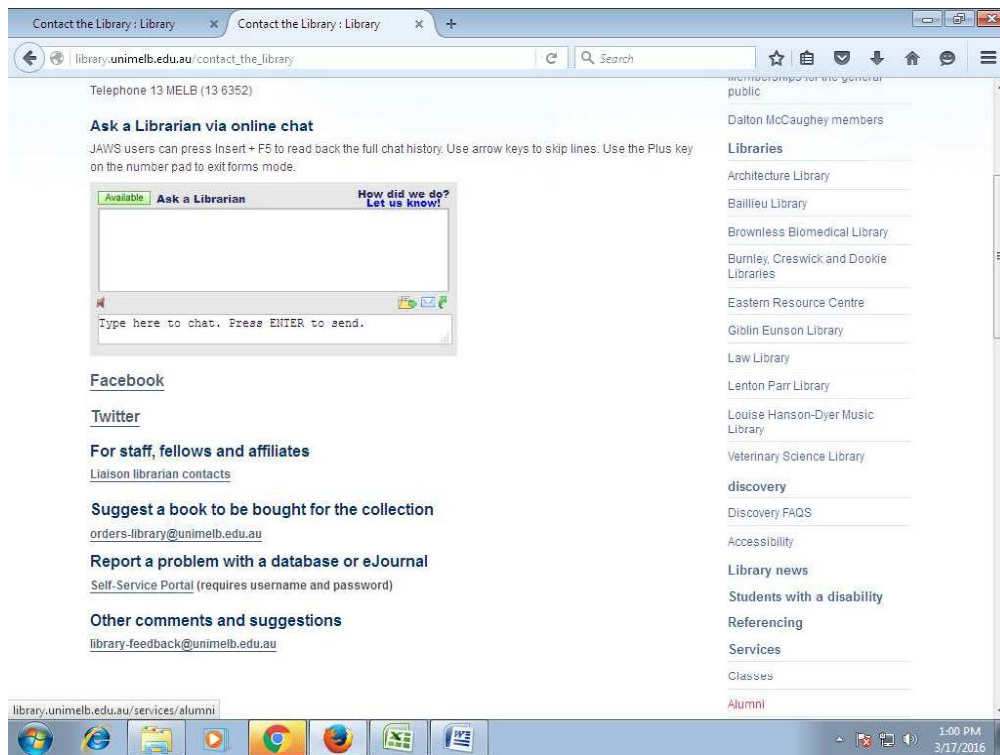


Screenshot 4.45: Use of WordPress at Universidad de Puerto Rico library

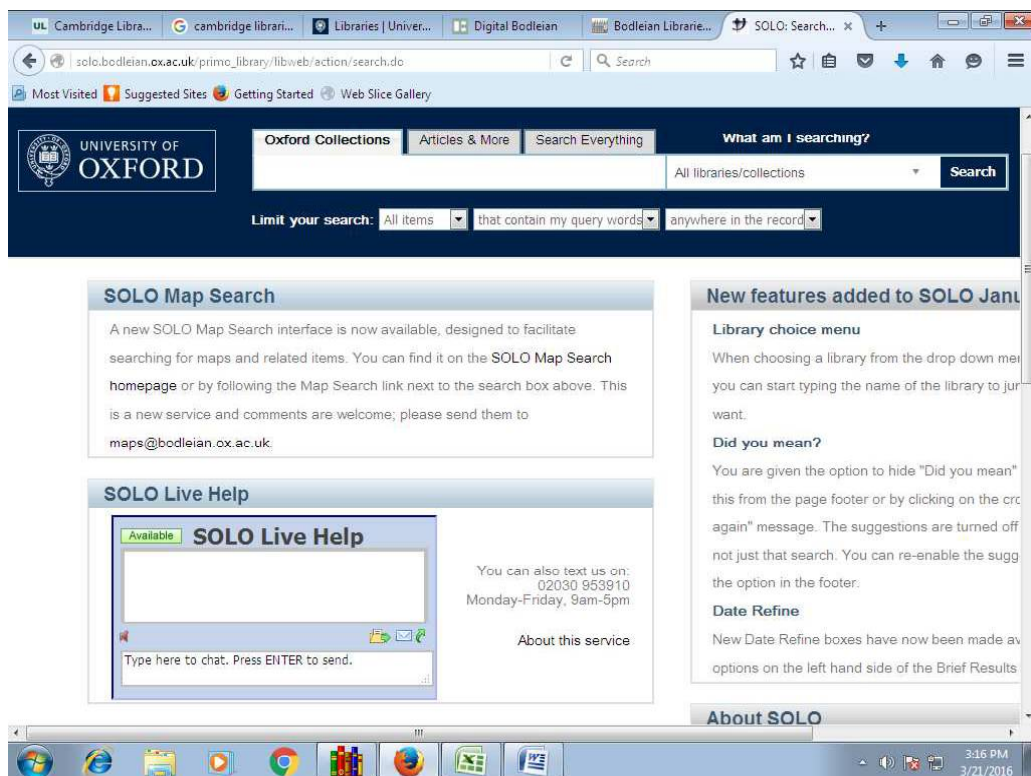


4.2.2.4. Instant Chat/Messaging: Instant chat/messaging facility on library website provides a platform to interact with on duty librarian and library staff. Patrons do not have to come to the library to ask any help or make an enquiry. Most of the libraries use Meebo, Yahoo messenger, AOL messenger, Skype, Windows live messenger, Google talk, Solo Live (Screenshot 4.47) , etc. instant messaging web-based application to interact with their users (Awang, 2012). Through this service library staff can handle users' inquiries instantly on pre-defined time period irrespective of the user's location. It is also called as virtual reference service desk (Dhande, 2014).

Screenshot 4.46: Instant Chat/message service of the University of Melbourn library

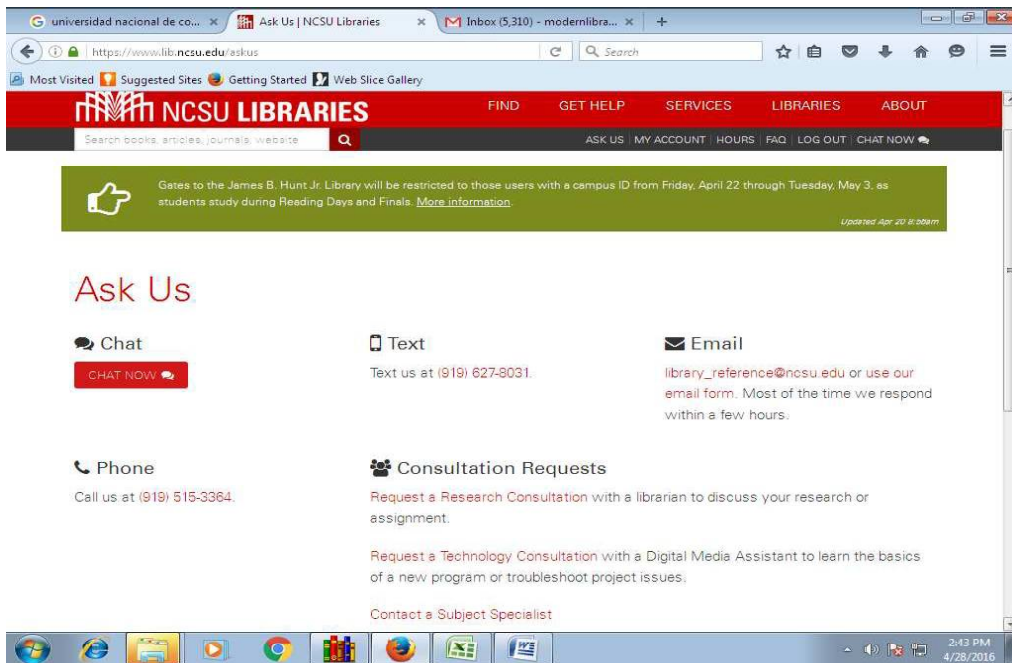


Screenshot 4.47: Instant messaging service at the University of Oxford library

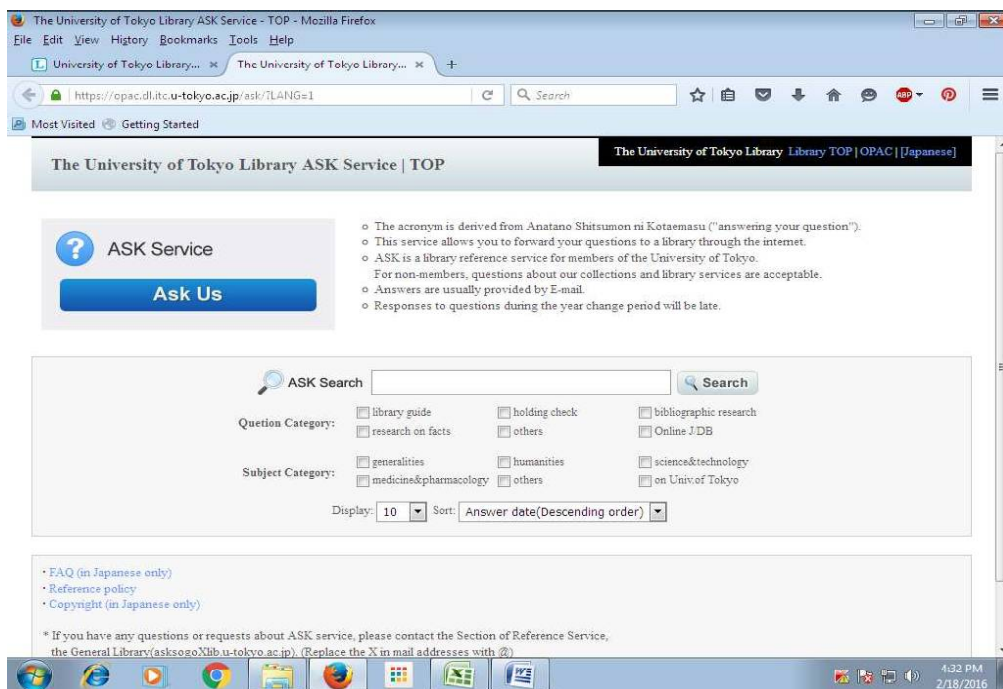


4.2.2.5. Ask Us: It is an online consultation service to solve patron's questions or service inquiries. University libraries are using web forms, email, telephone, WhatsApp, social networks, instant chat/messaging, FAQs, and Fax platforms. The details are communicated on the library website.

Screenshot 4.48: Ask us service by NCSI libraries



Screenshot 4.49: The University of Tokyo library's ask us service



Screenshot 4.50: Ask us service by the University of Cambridge library

The screenshot shows a web browser window with the URL `answers.libraries.cam.ac.uk/form.php?queue_id=0`. The page content includes a message: "Please give an e-mail address so we know where to send your answer. We will not share your email address." Below this is a section titled "Your Question" with a "Question" text input field and a "More Detail/Explanation" text area. There are buttons for "Attach a file" and "Attach another file". The "Your Info" section contains "Email *" and "Name *" text input fields. At the bottom, there is a checkbox labeled "Receive an email confirmation of your submission." The browser's taskbar at the bottom shows the time as 12:43 PM on 3/21/2016.

Screenshot 4.51: Ask us service by the Melbourne University library

The screenshot shows the homepage of the University of Melbourne library at `library.unimelb.edu.au`. The header features the university logo and navigation links for "STUDY", "RESEARCH", "ENGAGE", and "ABOUT US". A large banner image shows people working in a library, with the text "New Research Fellowships" and "Williamson Foundation Fellowships now open". Below the banner is a "More information" link. On the left, there is a "Chat with a Librarian" widget with a text input field and a "Send" button. On the right, there are buttons for "Login to your Library borrowing record" and "Book a room or computer". Below these is the "Discovery Search" section, which includes a search input field and a "Search" button. The browser's taskbar at the bottom shows the time as 12:24 PM on 3/17/2016.

3.2.2.6. Research / Subject Guides: In university libraries, researchers are always asking research support and guidance from library reference section staff. In top university libraries departmental libraries and separate subject librarians are there to manage subject collection and services. University libraries provide active service to researchers by providing them online research or subject guidance called subject guides or research guides. Subject guides are nothing but all information about resources and services for that subject available in the library. Subject librarians compile list of print as well as online resources in that subject along with research support they are providing like citations, plagiarism, software or help, writing and referencing, news, personal assistance etc. using web technology. For separate subject, separate research portal or PDF file is created or uploaded on the website called subject guides. Subject guide 2.0 is defined as those created by Web 2.0 technologies like multimedia, multi-formats, collaboration, ease of use, global change, search box, browsing, link checking, integration with social bookmarking sites, RSS feed, tagging, interactivity, user input, blog or wiki, and statistics reporting. They have the capability to allow users to bookmark websites directly into their subject guides or to integrate it with major social bookmarking sites (Yang, 2009).

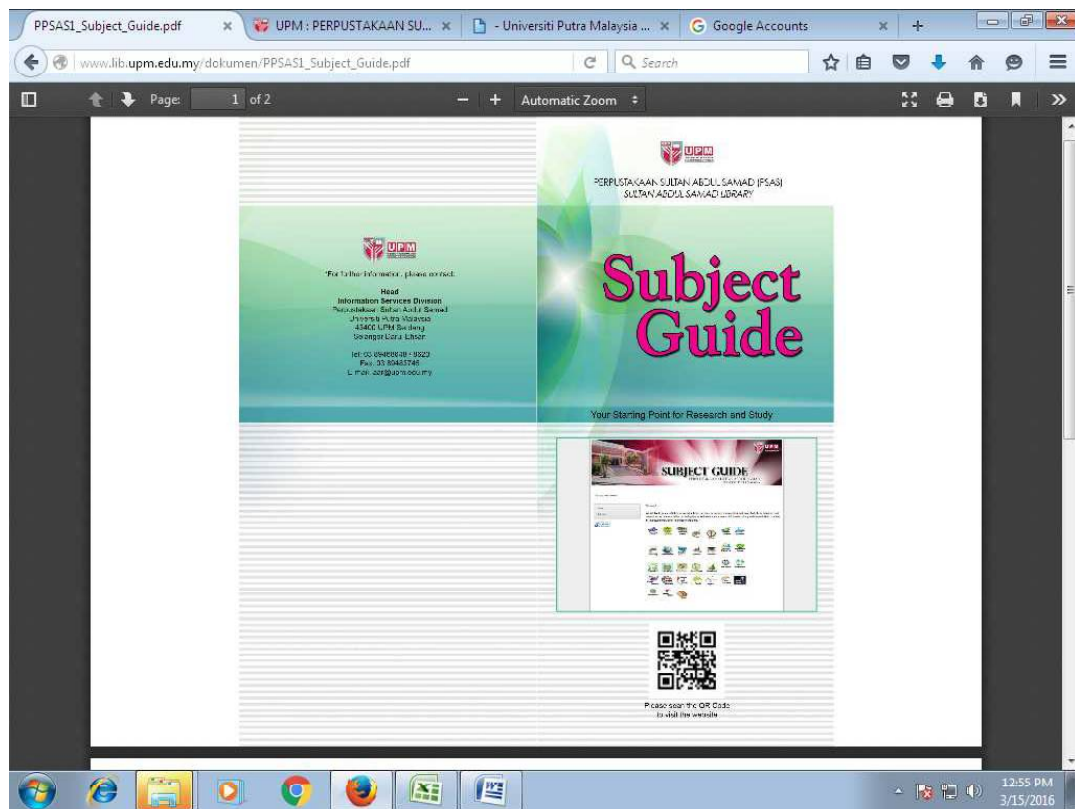
The Murdoch University Library has purchased a licensed Libguides from Springshare. Springshare vendor is a pioneer in designing template for Libguides or subject to avoid duplication of work. Using this platform library staffs is filling up and updating the contents easily.

The Springshare template allows staff to upload specific subject related tutorials, videos, podcasts or slideshows, PDFs, texts, library resources, instructions and online help to researchers in that subject (Springshare). No programming language knowledge is required and library staff can easily publish subject guides on the internet without going through a university server (Chan, 2010). Springshare integrates Libguides with Facebook and other social networking sites like Twitter and delicious (Springshare, 2009, p.12).

Many university libraries are using such commercial or open source templates like Libdata from the University Of Minnesota, MyLibrary from the University of Notre Dame, Pirate Source from the Eastern Carolina University, Research Guide from the University of Michigan, SubjectPlus by Ithaca College and Library Course Builder (Yang, 2009) to prepare subject guides and provide research support.

An example of a static subject guide in the form of PDFfiles by Perpustakaan Sultan Abdul Samad Library of Universiti Putra Malaysia Library is as follows.

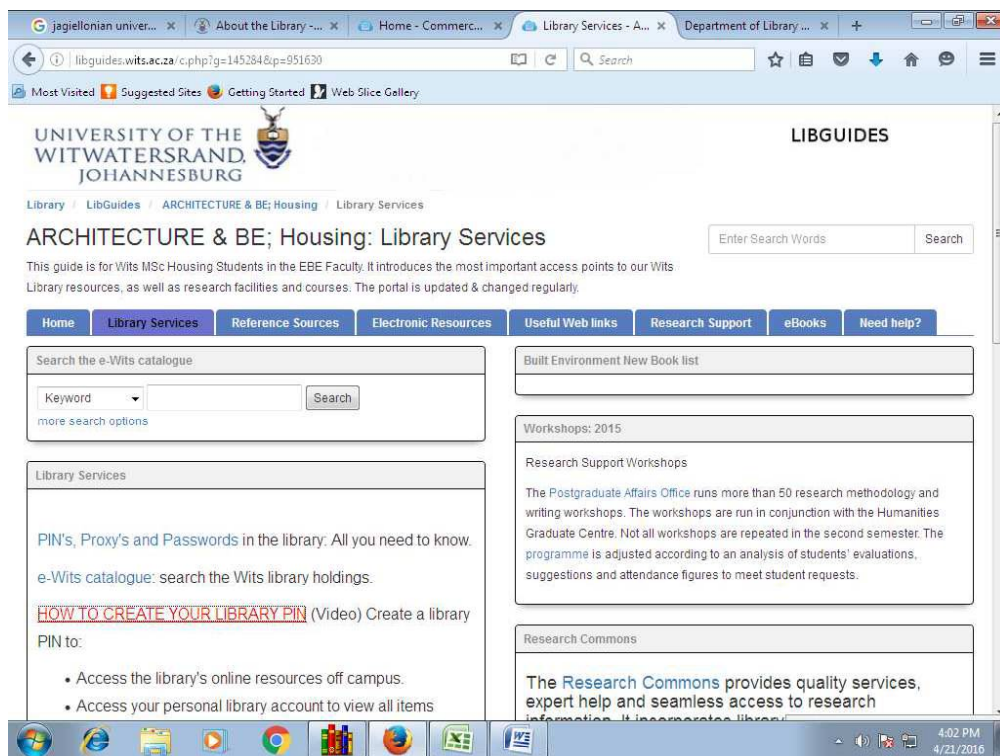
Screenshot 4.52: Subject guides service of theUniversitiPutra Malaysia library



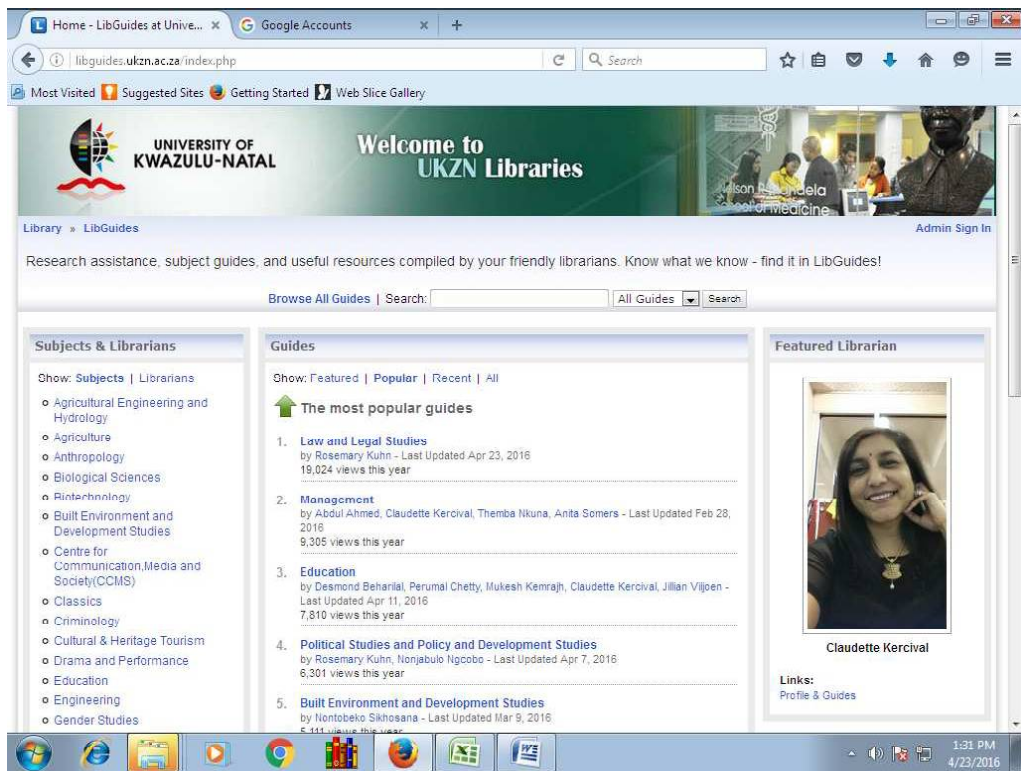
The University of Witwatersrand, Johannesburg provides different subject guides which include research support, reference sources, electronic resources (Screenshot 4.55), useful web links, ebooks, OPAC and personal help to group of researchers (Screenshot 4.53). Normally, all guides are organized alphabetically and category wise (Screenshot 4.54). Altogether all guides are called library guides. The University libraries in European

countries are developing subject gateways to help users to find high quality information resources available on the internet equivalent to search engines or web directories. A subject gateway is the databases of detailed metadata records of internet resources and offers a hyperlink to the resources. Patrons or researchers can search the database by keywords or browse the resources under subject headings (Hatua).

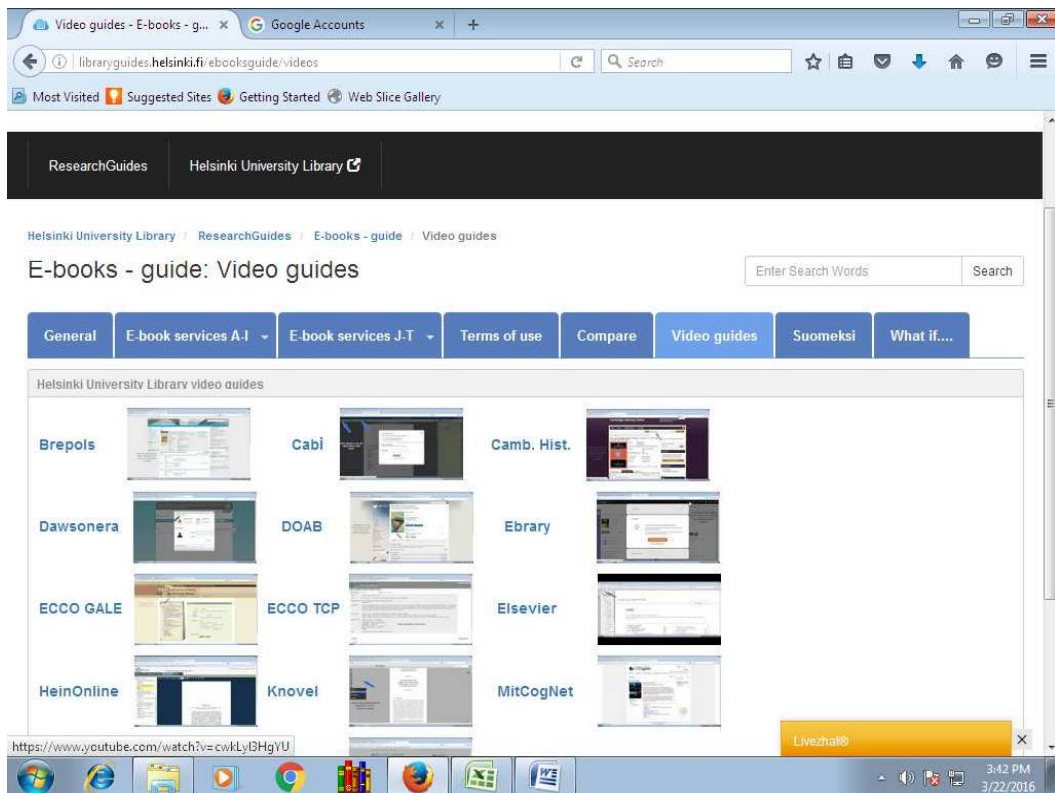
Screenshot 4.53: Research guides of the University of the Witwatersrand Johannesburg



Screenshot 4.54: Research/subject guides of the University of Kwazulu Natal libraries

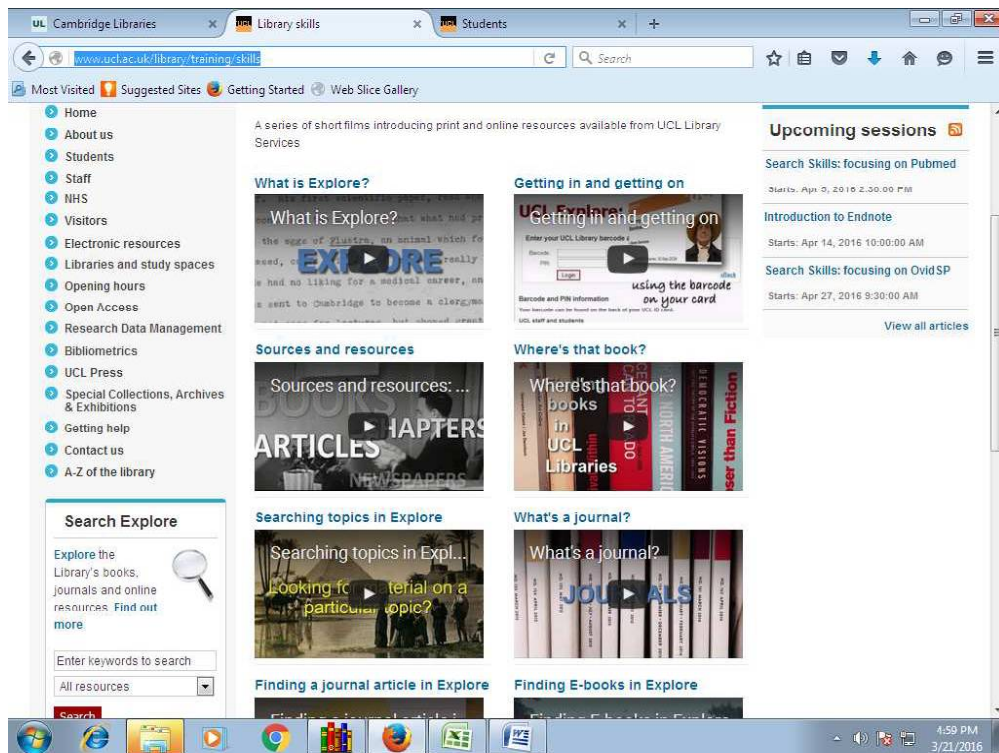


Screenshot 4.55: E-books guides of the Helsinki University library

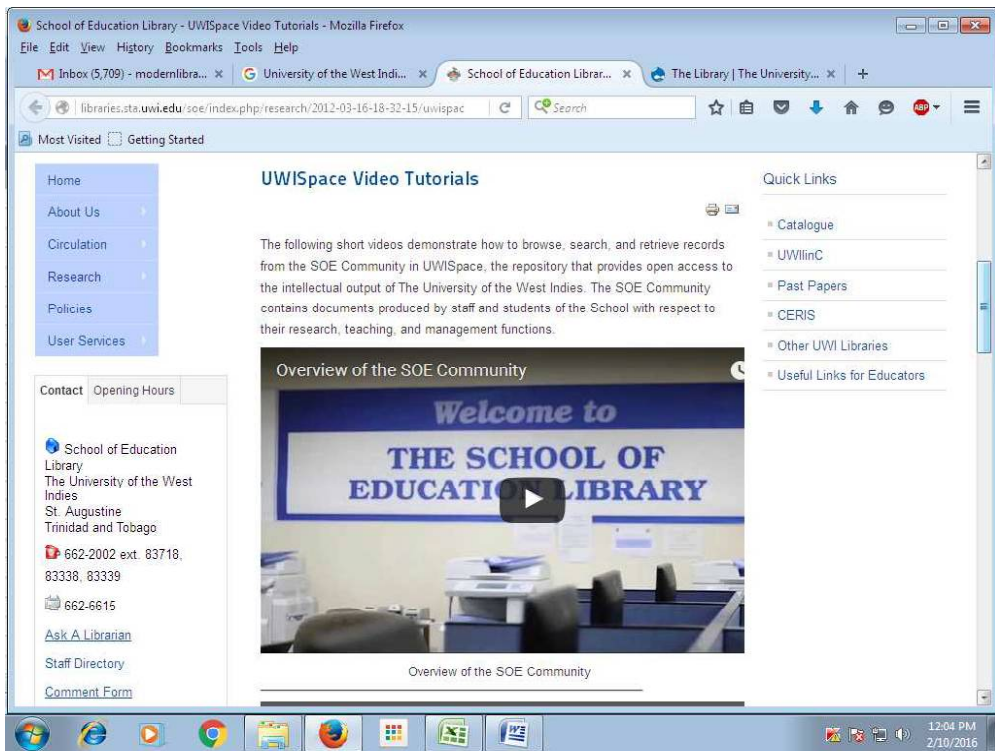


4.2.2.7. Video Tutorials: Library guides or instructions communicating with the patrons in an interactive way using multimedia technology. Video Tutorials are provided by top university libraries. Watching video tutorials are always appreciated and more understandable and catchy than reading the text instructions. Therefore, for giving instruction, orientation, demonstration top university libraries are preparing video tutorials and gives access to them on their websites. Video tutorials are effective learning and teaching media. Sometimes university libraries upload these videos on YouTube or Vimeo platform and then embed these videos on library websites. Sometimes these video tutorials are available on library websites itself. The University College London Libraries published a series of short films or videos introducing their library collection and services. In below screenshot 4.56 library has created short videos to train users on how to search e-discovery tools or OPAC, how to locate library material like books, journals, ebooks, articles, etc. along with how to access various database resources, plagiarism checking software, and various services offered by libraries and how users can get the benefit of those services (Screenshot 5.57 & 5.58).

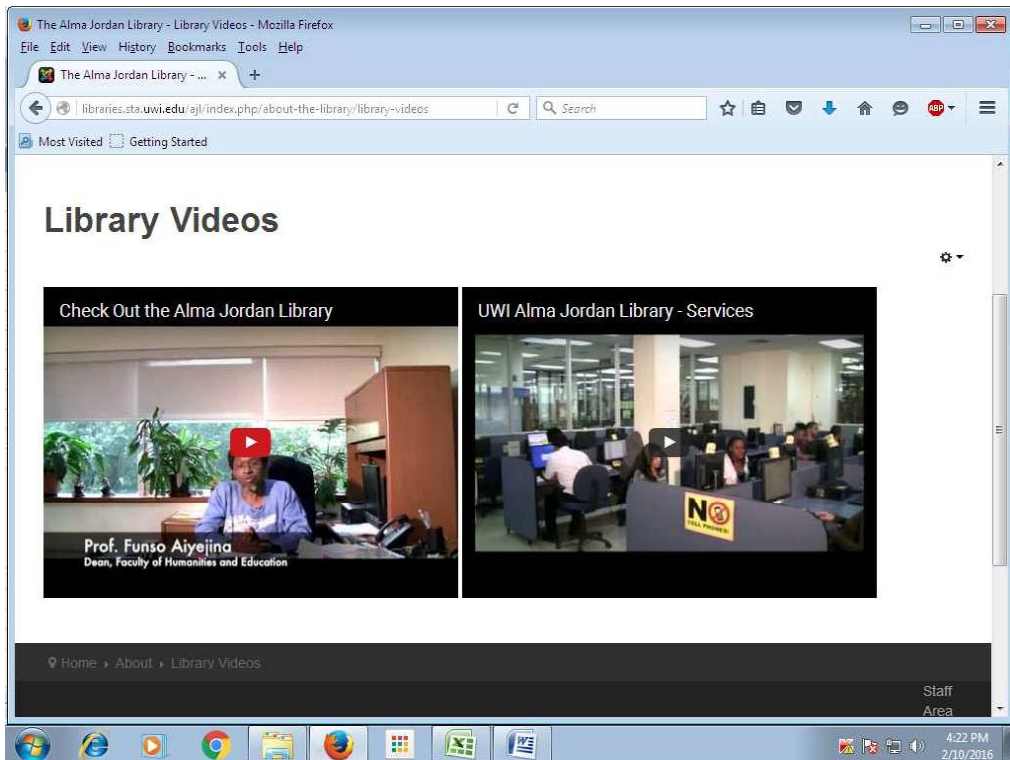
Screenshot 4.56: Video tutorials of the Cambridge university library



Screenshot 4.57: Video tutorials of the University of West Indies library

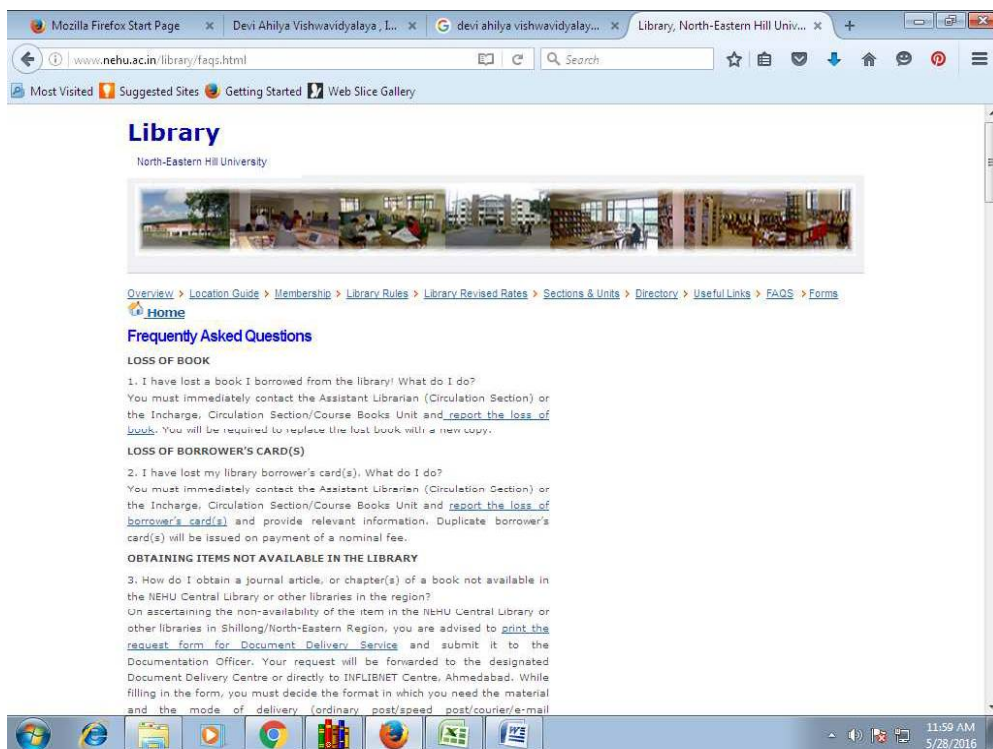


Screenshot 4.58: The Alma Jordan Library tutorial videos



4.2.2.8. FAQs: Newly admitted patrons in the University Libraries regularly asks many questions about library collections, services, facilities as they are not aware of functioning of the library or any changes made in services. There are many common questions library staff needs to answer to all patrons, so to avoid repetitions to constantly ask questions and to save the time of patrons and staff answers to frequently asked questions are made available on library websites for reference purpose. Patrons do not need to call or email or personal visit library to ask his or her queries. Frequently Asked Questions (FAQs) are a compilation of alist of frequently asked questions by the library patrons and their answers.

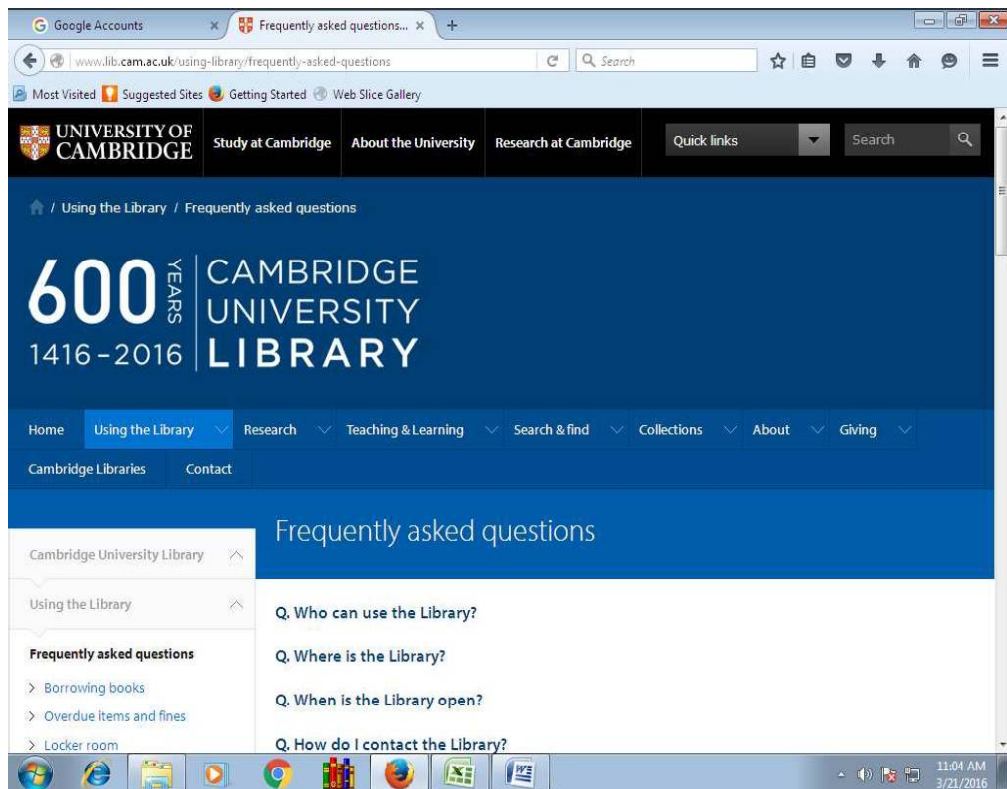
Screenshot 4.59: FAQ service by the North-Eastern Hill University library



Screenshot 4.60: FAQ service by the Portail National de Signalement des Theses

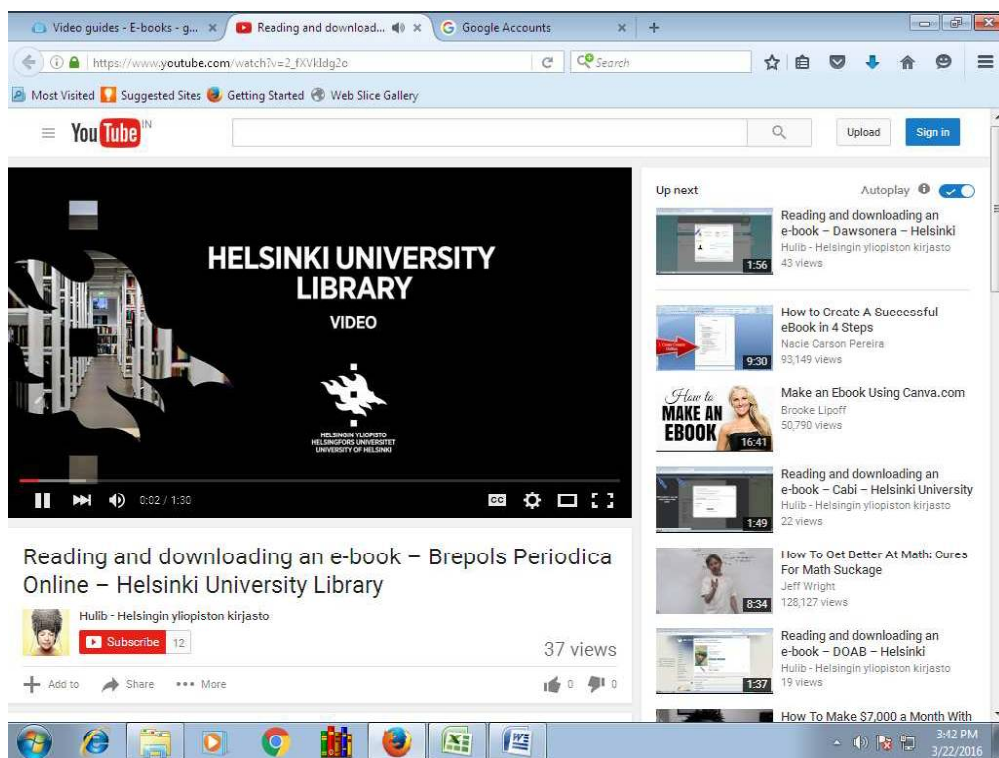


Screenshot 4.61:FAQ service by the Cambridge University library



4.2.2.9. YouTube: YouTube application is used for video sharing widely. It allows anyone to post and share their videos, tutorials, recordings publicly or privately. It is a very effective way to deliver or broadcast tutorials of library procedures, to educate patrons and increase use of library resources and promote library services and events. The Helsinki University library uploaded video of reading and downloading e-books and e-journals online (Screenshot 4.62), Witwatersrand University library uploaded video of how to create pin for accessing online e-resources (Screenshot 4.64), the Indira Gandhi Memorial Library of University of Hyderabad (Screenshot 4.63) and the Brender Library uploaded videos of their laptop zone (Infrastructure or different sections) (Screenshot 4.65) , the Tej Aviv university library uploaded video of how to access webopac and e-discovery tool on YouTube.

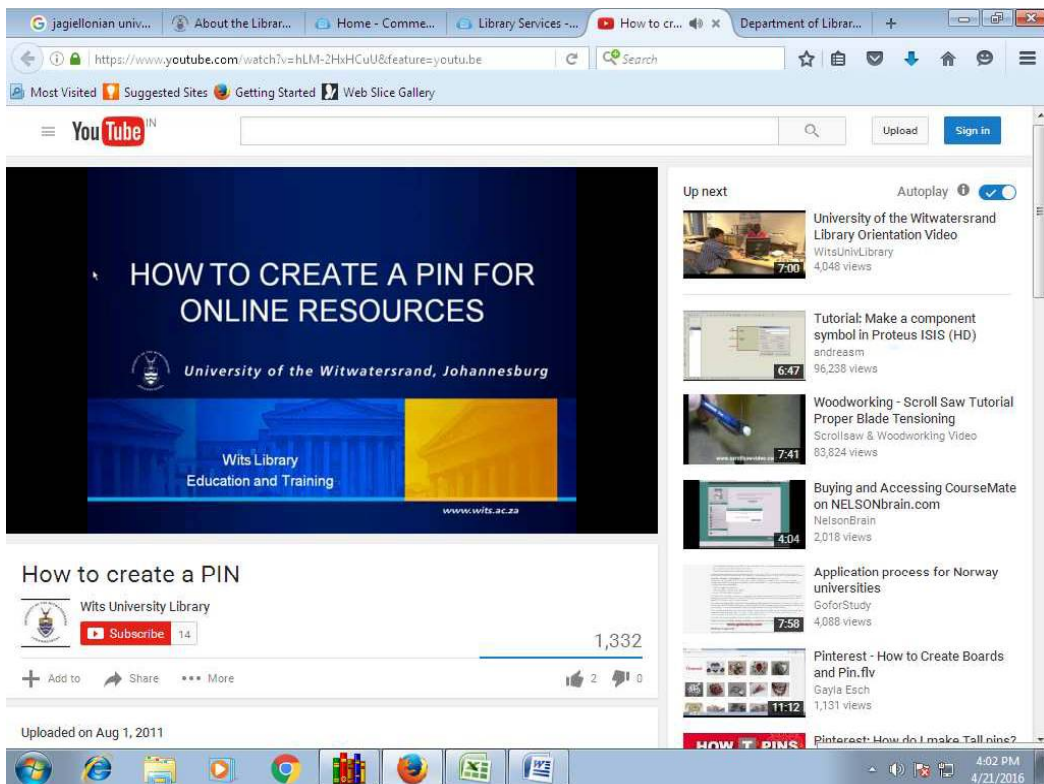
Screenshot 4.62: The use of YouTube by Helsinki University library



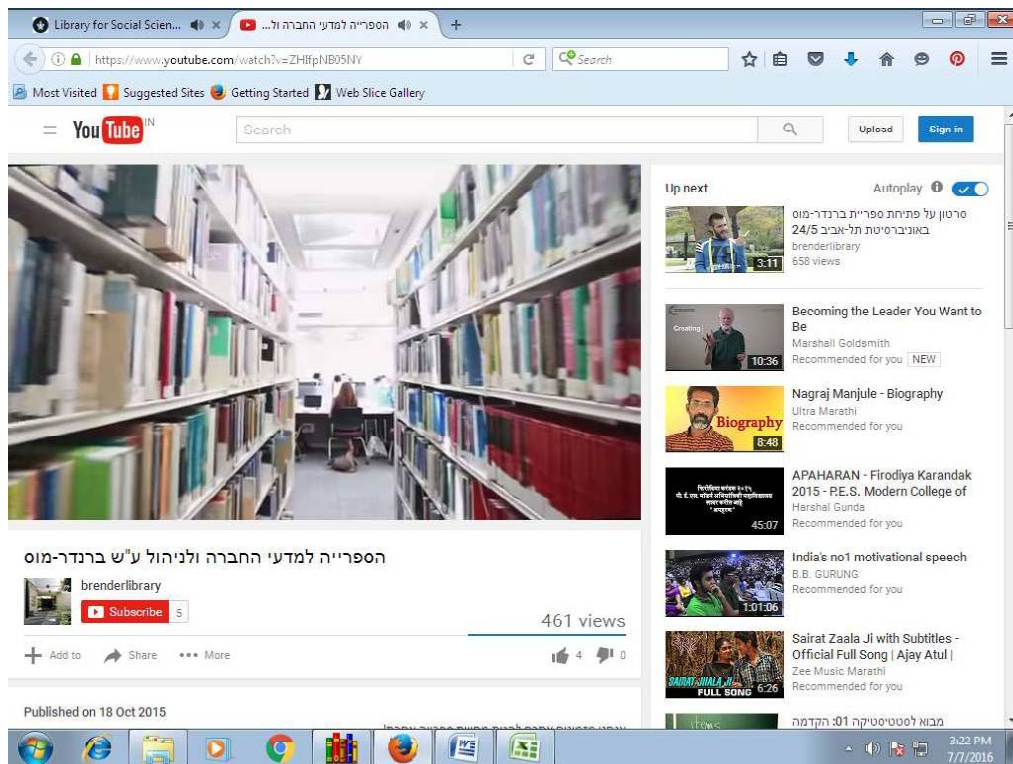
Screenshot 4.63: The use of YouTube by the University of Hyderabad library



Screenshot 4.64: The use of YouTube by the University of Witwatersrand library



Screenshot 4.65: The use of YouTube by the Brender library



4.2.2.10. Service Directory: Under this column University library provides a list or directory of library services and staff. Top world University libraries are collection of libraries centrally accessible. To contact library staff of specific departments or section or service or library this directory helps patrons to reach that staff using details like email ids or contact numbers given in this service or staff directory. Few examples of University libraries providing service directory areas follow the Hebrew university of Jerusalem departmental library (Screenshot 4.66), the UKZN libraries (Screenshot 4.67), the King Abdul Aziz University, the Nehu library, the Tsinghua university library and the Australian National university library service directories (Screenshot 4.68).

Screenshot 4.66: Service directory of the Hebrew University of Jerusalem library

The Hebrew University of Jerusalem
Mathematics and Computer Science Library

Home Services Information Description Classification Serials Electronic resources Tutorials Internet Sites News Contents Web Catalog

Library services & staff שירותי הספרייה

email: library@math.huji.ac.il Fax: 972-2-6586505 [find us on facebook](#)

Library Administration [Library Administrator](#) Phone: 02-65-84820 Naavah Levin jmclib@savion.huji.ac.il ראש צוות הספרייה
Fax: 02-6586569

Service	Information	Phone	Contact	email	תפקיד
Acquisition	FAQ	02-65-84820	Naavah Levin		רכישה
Cataloging	Library catalog Classification system	02-65-84500	Naavah Levin		קטלוג
Periodicals	Current serials	02-65-86810	Tali Buzia Schwimmer		כתבי עת
Electronic	Electronic journals	02-65-84500	Naavah Levin		עיתונים אלקטרוניים

Screenshot 4.67: Service directory of the University of Kwazulu Natal library

UKZN Subject Librarians

library.ukzn.ac.za/SubjectLibrarians772.aspx

The Premier University of African Scholarship

ResearchSpace WorldCat Local Catalogue Search Site Search

UKZN Home General Information My Library Account Electronic Resources Libraries Collections Services Guides Useful Links Sitemap Contact Us

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

Welcome to UKZN Libraries

WMS Staff Interface Change Font Size | A | A | A | [j-shareIt](#) [bookmark](#) Print | Email | RSS News Feed

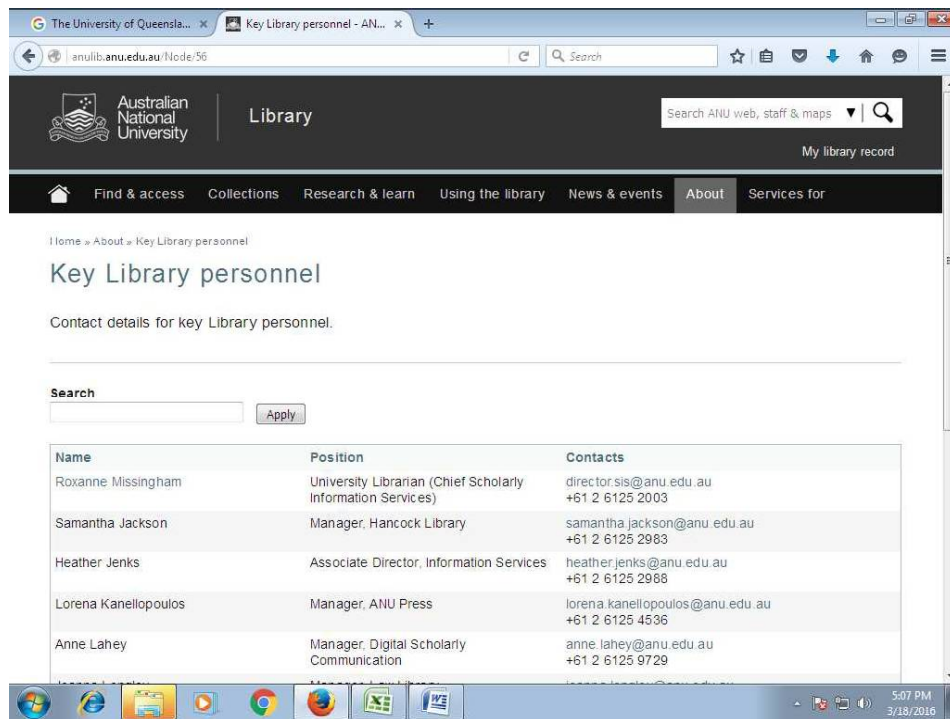
Navigation

- Home
- INFORMATION SEARCHING BY SUBJECT
- Built Environment
- Arts
- Agriculture Earth & Environmental sciences
- Applied Human Sciences
- Education
- Engineering
- Health Sciences, Medicine & Nursing
- Humanities
- Law
- Management Studies
- Life Sciences

Subject Librarians

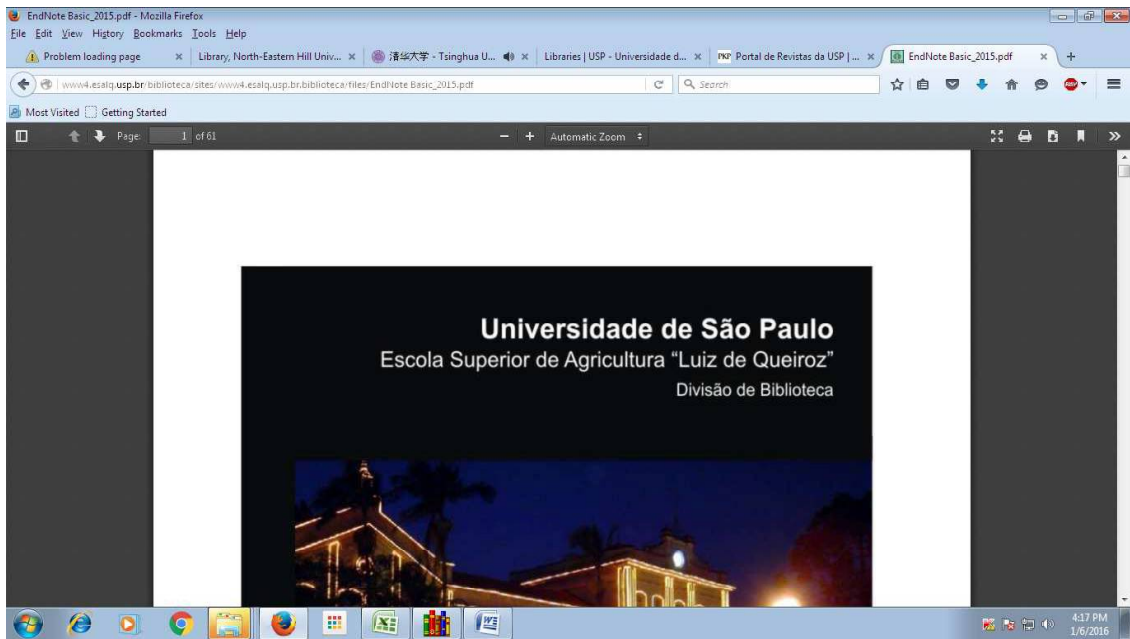
Subject	Librarian	Library	e-Mail	Telephone
Accounting & Auditing	Richard Behanlal	Westville	behanlal@ukzn.ac.za	+27-31-2607450
Accounting & Auditing	Themba Nkuna	Pietermaritzburg	nkumat@ukzn.ac.za	+27-33-2606428
Actuarial Science	Ashika Pramlal	Westville	pramlala@ukzn.ac.za	+27-31-2608121
Actuarial Science	Jillion Viljoen	Pietermaritzburg	viljoenj@ukzn.ac.za	+27-33-2605261
Agricultural Economics	Simon Shezi	Life Sciences, Pietermaritzburg	shezim@ukzn.ac.za	+27-33-2606068
Agricultural Engineering	Shorba Harkhu	Life Sciences, Pietermaritzburg	harkhus@ukzn.ac.za	+27-33-2605162
Agricultural Extension & Rural Resource	Simon Shezi	Life Sciences, Pietermaritzburg	shezim@ukzn.ac.za	+27-33-2606068
Agrometeorology	Shorba Harkhu	Life Sciences, Pietermaritzburg	harkhus@ukzn.ac.za	+27-33-2605162
Animal & Poultry Science	Simon Shezi	Life Sciences, Pietermaritzburg	shezim@ukzn.ac.za	+27-33-2606068
Anthropology	Nonjabulo Ngcobo	Howard College	Ngcobon16@ukzn.ac.za	+27-31-2602061
Anthropology	Renee Damonse	Pietermaritzburg	damonse@ukzn.ac.za	+27-33-2605056

Screenshot 4.68: Service directory of the Australian National University library

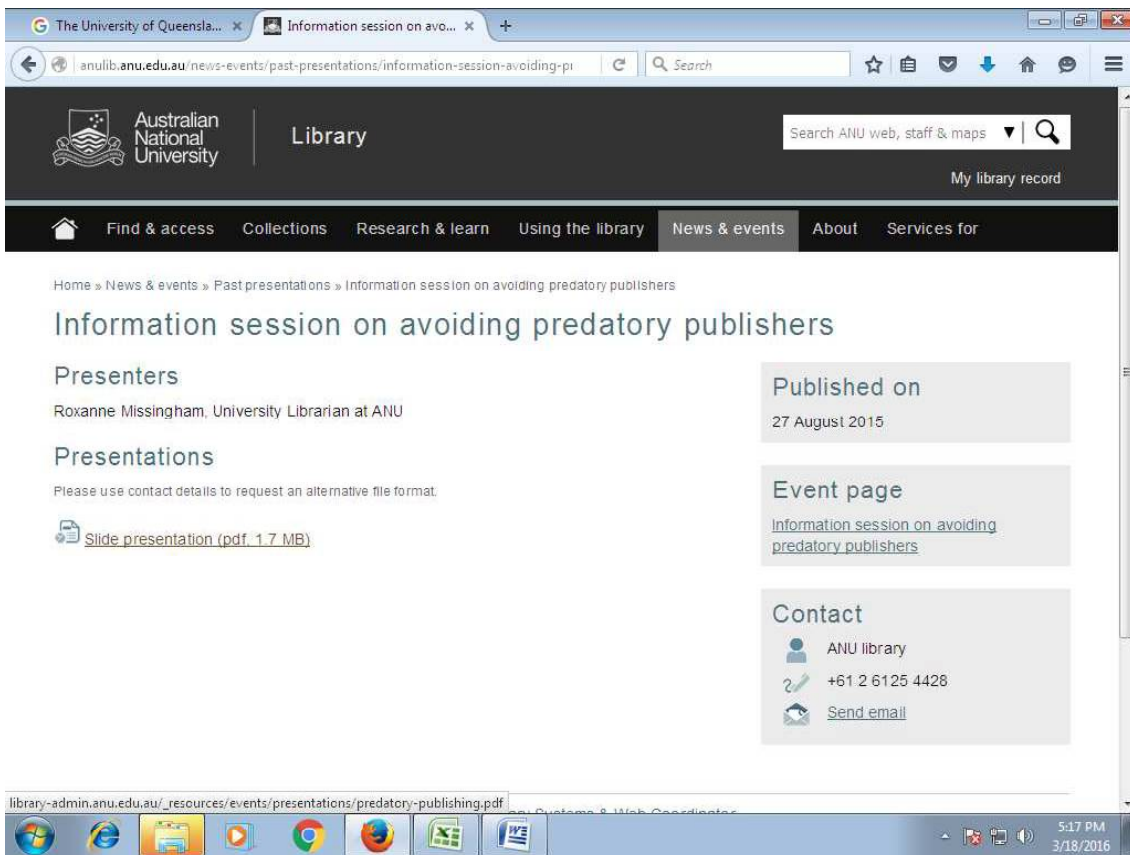


4.2.2.11. PPTs/PDFs: To educate patrons and give them instructions to access resources, forms, documents and avail the facilities of library many university libraries creates PPTs and PDF files. To upload and give links to presentation and PDF files is very easier task than creating a video or audio tutorial to educate patrons. Below are a few examples of the Australian National University library, the Universidade de São Paulo library, the Universidad de Puerto Rico Mayaguez library, the University Putra Malaysia library and the Universidad de Puerto Rico library uses PDFs and PPTs for patron education are mentioned here in the Screenshot 4.69 to 4.73.

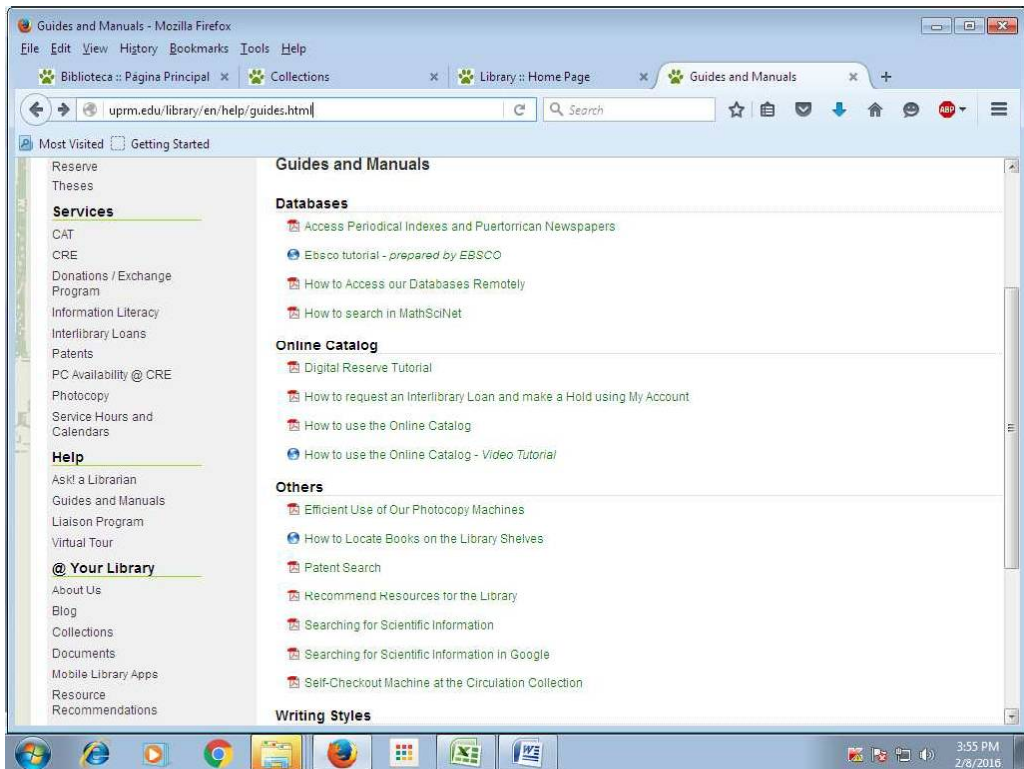
Screenshot 4.69: The use of PDFs at Universidade de São Paulo library



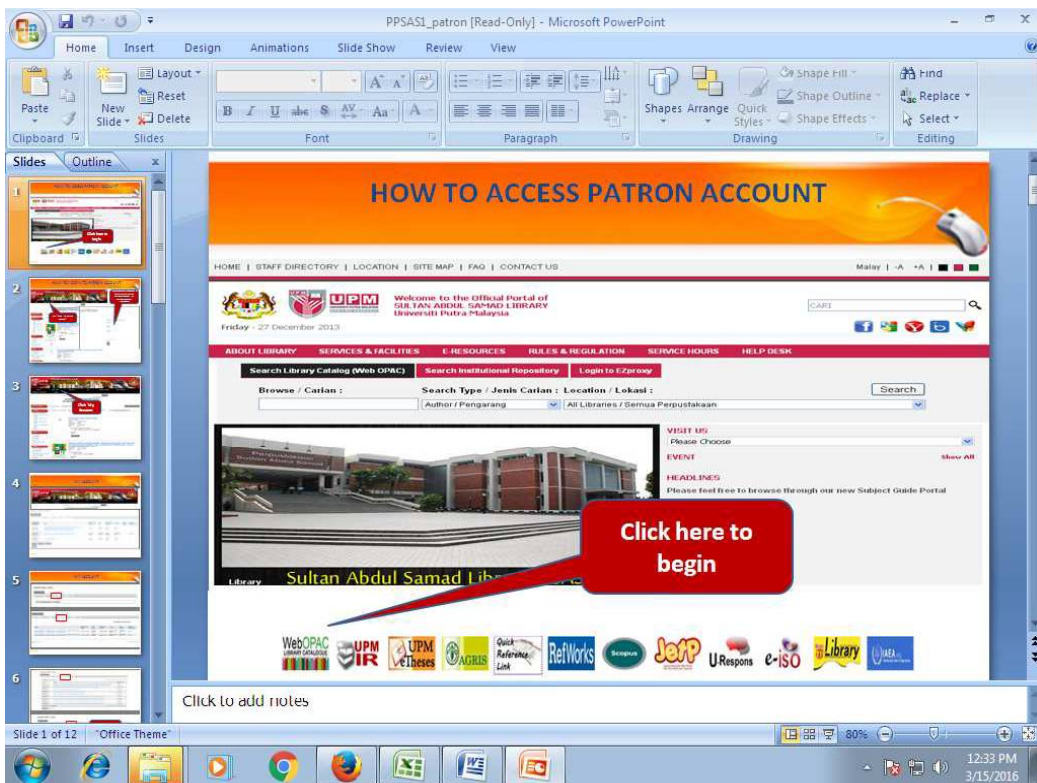
Screenshot 4.70: Use of PPTs at Australian National university library



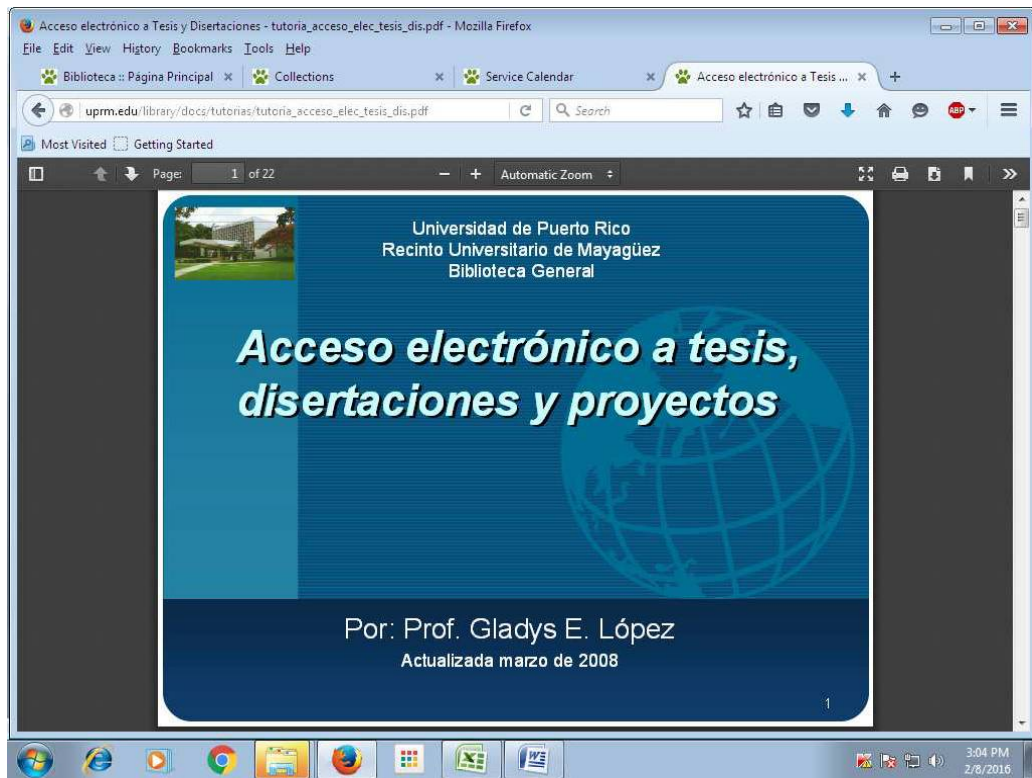
Screenshot 4.71: Use of PDFs at Universidad de Puerto Rico Mayaguez library



Screenshot 4.72: Use of PPTs at University Putra Malaysia library

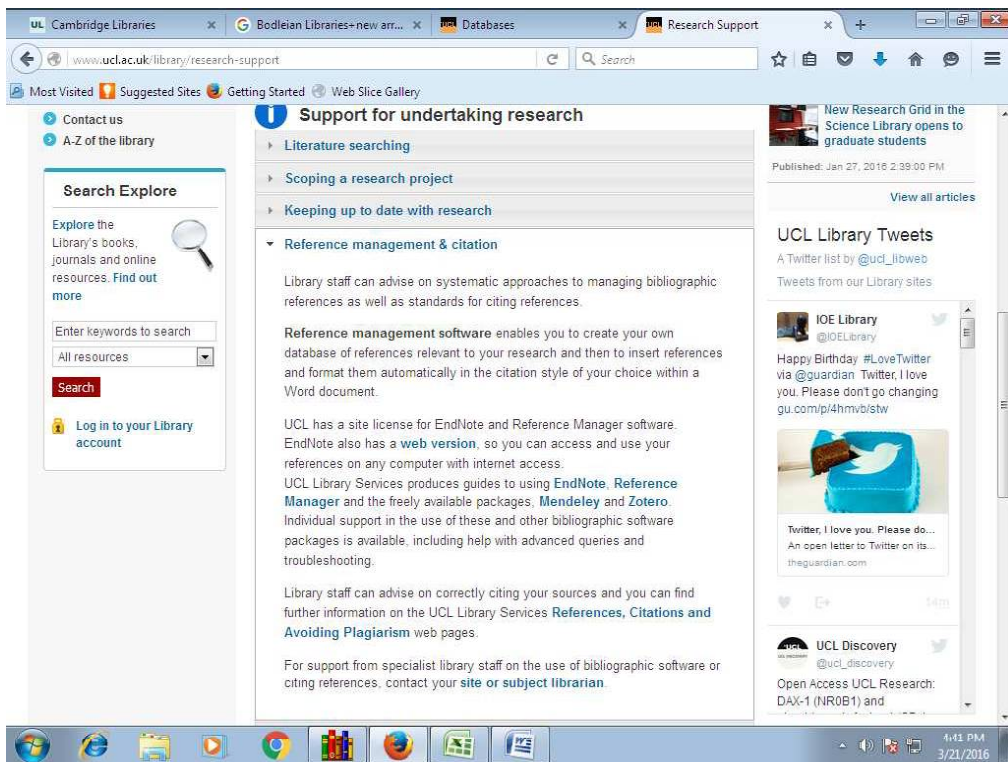


Screenshot 4.73: Use of PDFs at Universidad de Puerto Rico library



4.2.2.12. Research Tutorials: The main objective of any University library is to support and promote research. To fulfill these objectives top University libraries providing web based research support and creates tutorials to help researchers about literature search or review, writing research project, reference management and citation, writing research papers, file patents, plagiarism checking software, impact factor, data management and discovery, copyrights, author networks, grants and funding etc. Subject specialists are ready to support researchers online. Research support is provided through social networking sites like Facebook, Twitter, etc. Screenshots of the Cambridge University and the NCSU libraries research tutorials are given in Screenshot 4.74 and 4.75.

Screenshot 4.74: Research tutorials of Cambridge University library



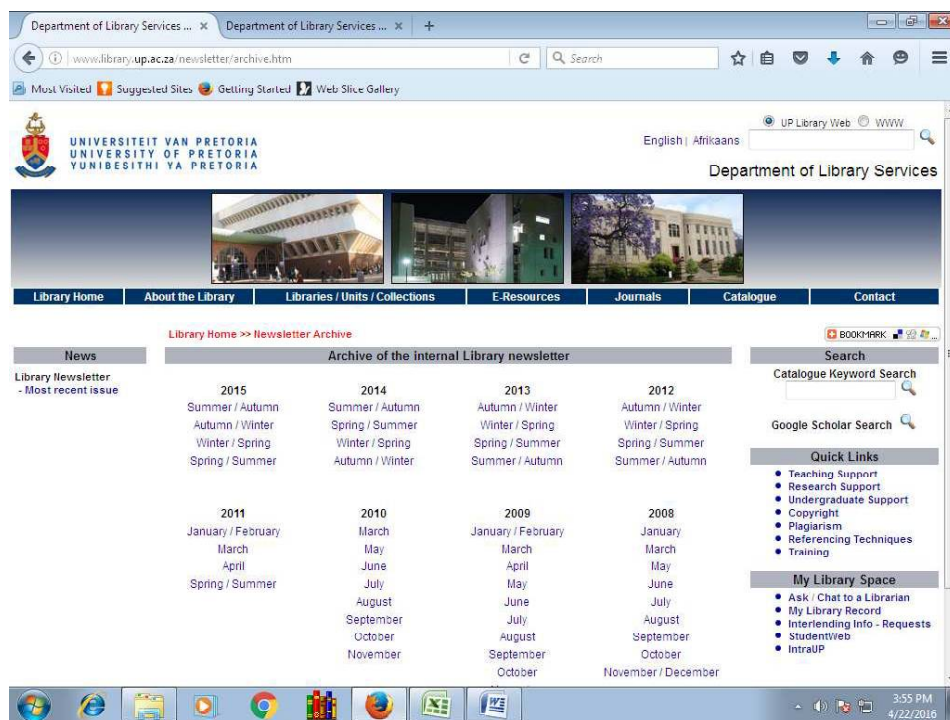
Screenshot 4.75: Research tutorial of NCSU library



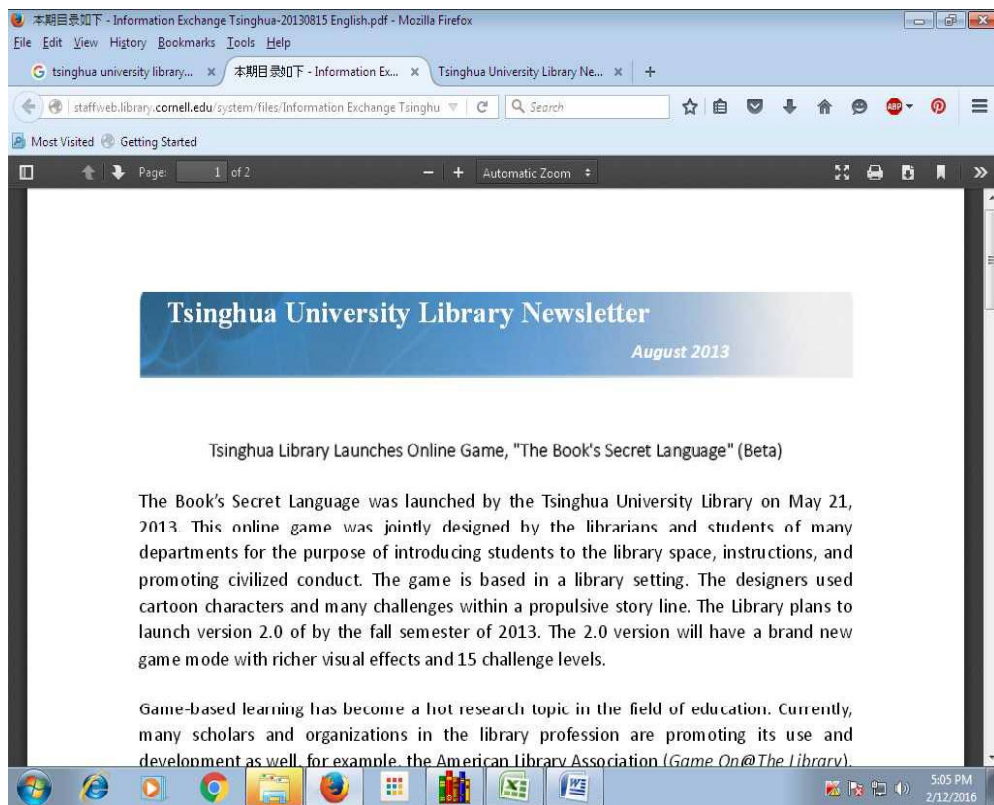
4.2.2.13. Tips to Access and Use the Library: Almost all top university libraries provide tips to access and use library resources and services on their website as text or html files.

4.2.2.14. Newsletter: To offer current awareness service university libraries publishes newsletters or bulletins. In these newsletters and bulletins contains information about library news, pictures of library activities, newly introduced services, sites, new additions, publications of the university, upcoming conferences, workshops, training sessions, fellowship programs, new stories, achievements and future plans of the library. Sometimes newsletter, bulletins involves patrons to contribute their articles, book reviews, etc. Frequency of publishing library newsletters is different for different libraries. The African University of Pretoria publishes its library newsletter quarterly (Screenshot 4.76), the Tsinghua University library publishes its newsletter monthly (Screenshot 4.77), and the University of Oxford Bodlian library publishes its newsletter bi-annually. The University Libraries publish these newsletters in the blog form or PDF format. These are uploaded on library websites as well as sent by email to all patrons.

Screenshot 4.76: Newsletter of University of Pretoria library

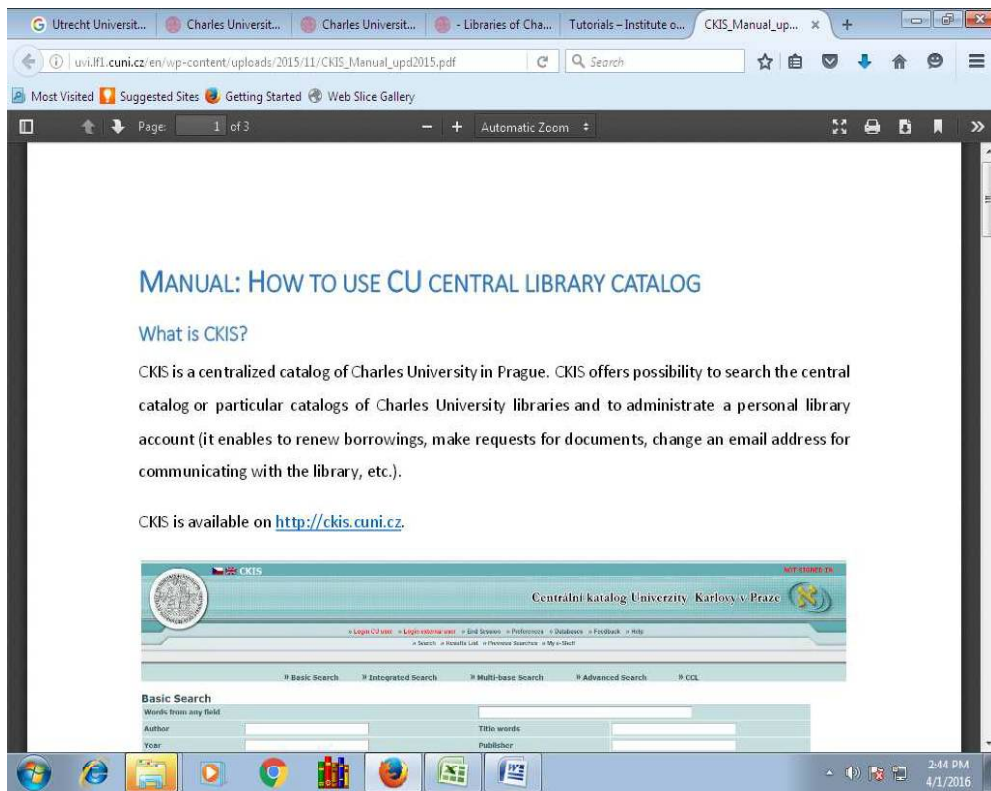


Screenshot 4.77: Newsletter of Tsinghua University library



4.2.2.15. Help Guides/User Guides: These are nothing but manuals or instructions provided by university libraries to patrons. In this chapter, subject guides are mentioned and how they provide support for research. Here these guides are to help patrons to understand procedures, services and the introduction of the library. It is either in PDF file, text file, PPTs, screenshots are used to explain the procedure. The Charles University of Prague and the University of Hyderabad library publishes their manuals in PDF format shown in Screenshot 4.78 and 4.80. Similarly the Tel Aviv University library provides instructions in the form of PPTs and Videos shown in Screenshot 4.79.

Screenshot 4.78: Manual/help guide of Charles University of Prague library



Screenshot 4.79: Library instructions/help guide of the Tel Aviv University library

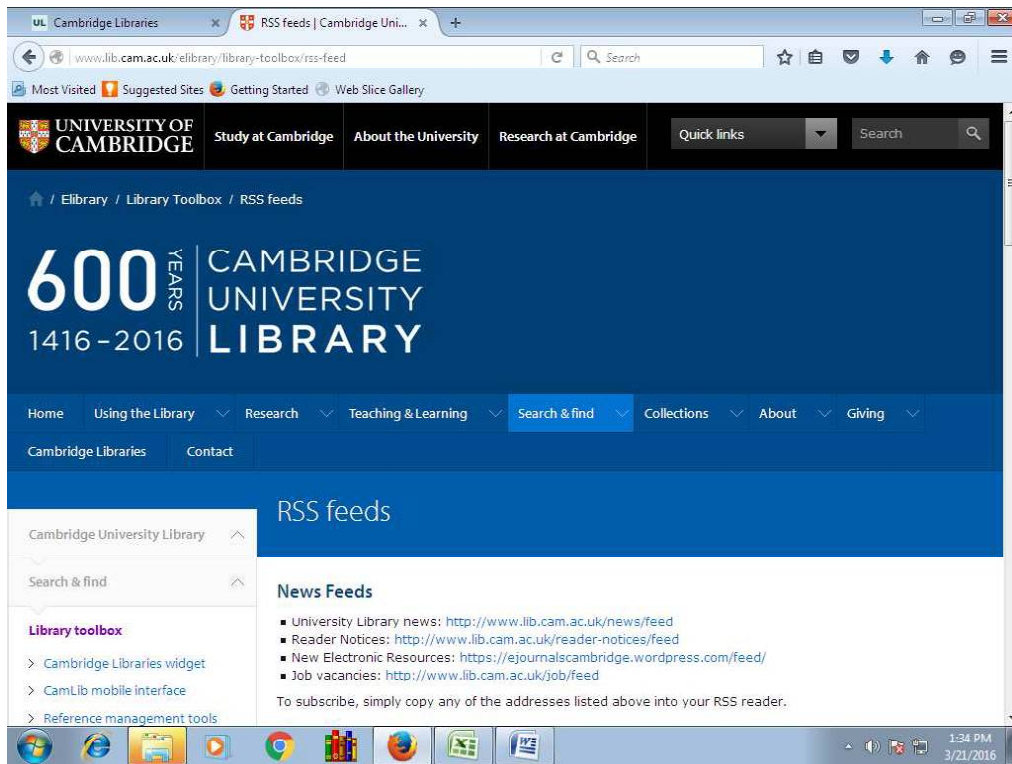


Screenshot 4.80: Library guide of the University of Hyderabad library

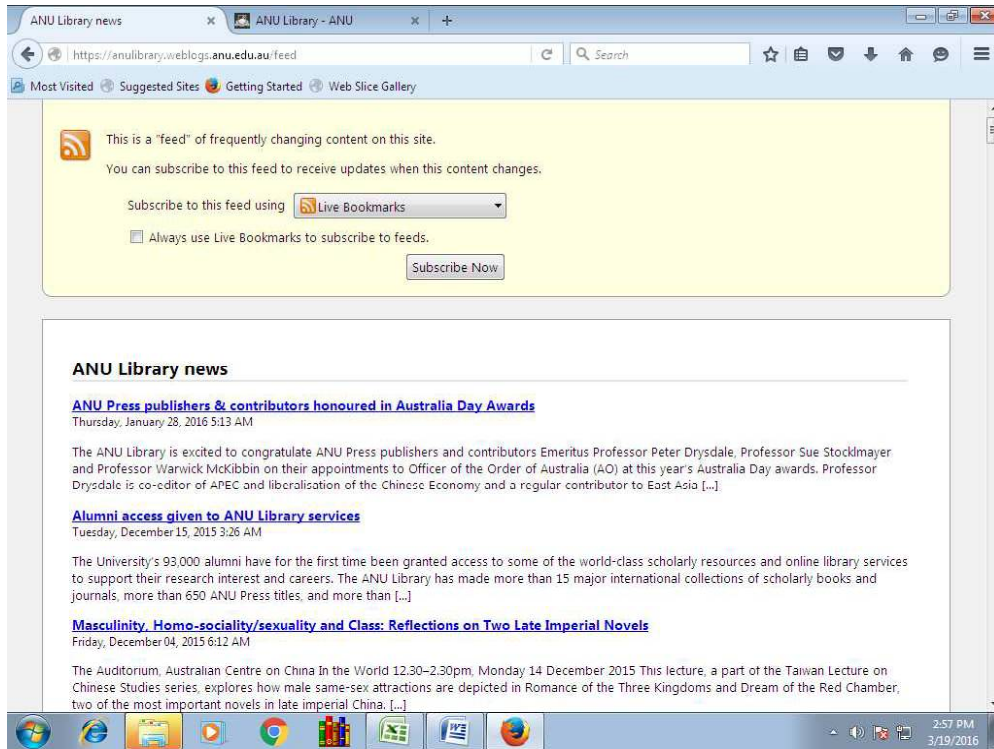


4.2.2.16. RSS Feeds: RSS is most popular and easy web 2.0 tools used in university libraries to give website updates to users in a personal manner without visiting websites (Dhande, 2014). It uses a family of standard web feed formats to publish frequently updated information like blog entries, news headlines, audio, video, etc, (RSS). The purpose of providing RSS news feeds in university libraries websites or blogs varies from library to library (Awang, 2012). RSS feeds enable publishers or libraries to syndicate data automatically. Using RSS feeds patrons can receive timely updates from the library news, SDI, CAS, Bibliographical services, Bulletin board services or websites or blogs automatically if they subscribe to their interested website RSS (Dhande, 2014). For instance, The Cambridge university library has provided RSS to library news, new resources, notices to readers and job vacancies. Similarly, the Australian National University library provided RSS to disseminate news and updates.

Screenshot 4.81: RSS feeds of the Cambridge University library

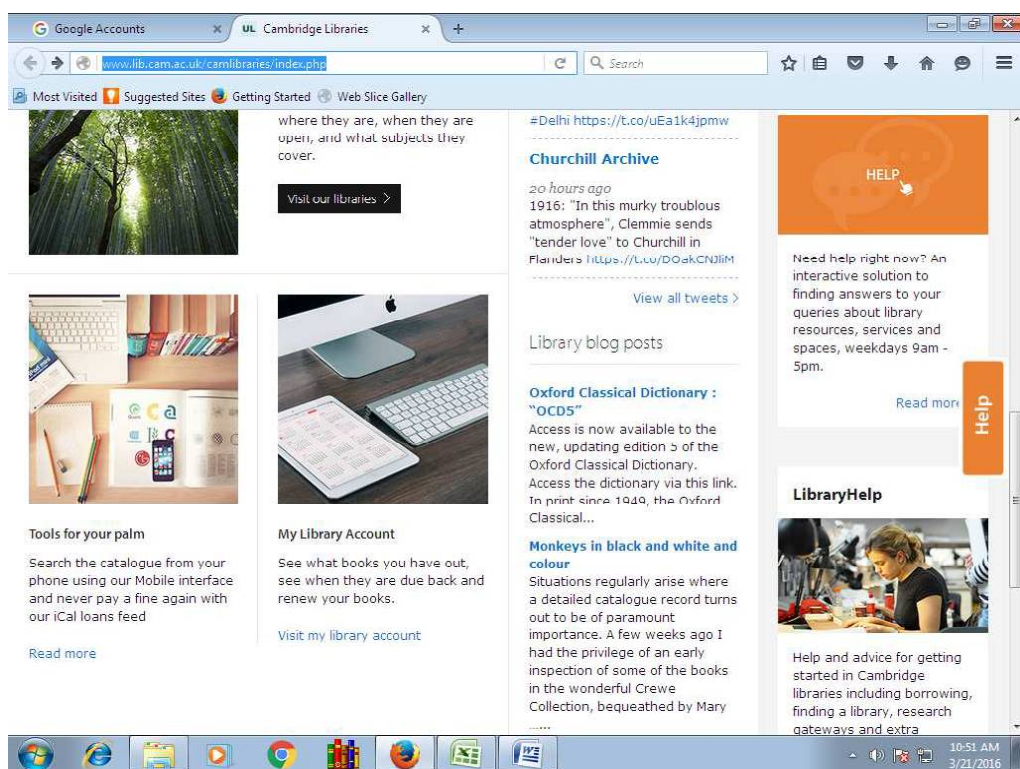


Screenshot 4.82: RSS feeds of the American National University library

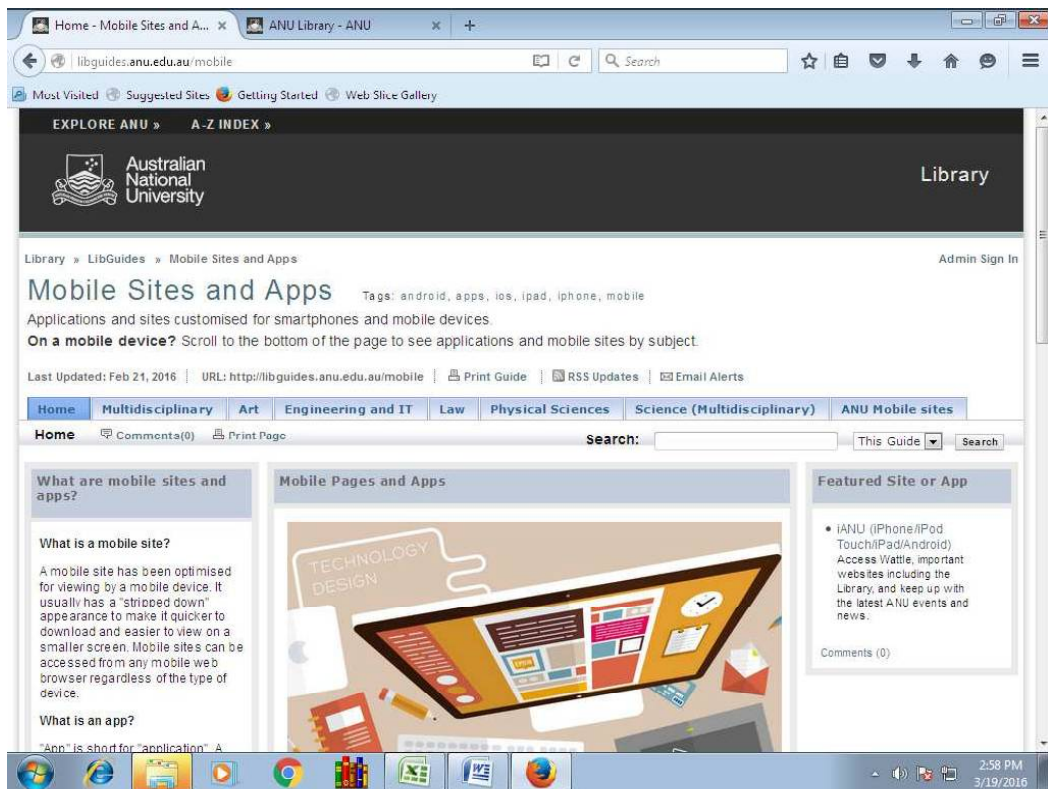


4.2.2.17. Mobile Application: With increasing use of mobiles among the patrons, university libraries are customizing their webpages and Web OPACs for mobile devices and smart phones to enable users to access library collection and information from their mobile devices. Mobile sites appearance is little different that actual sites. It is stripped down appearance to make it download quickly and view easily on smart phone's small screen. Screenshot 4.83, 4.85 and 4.86 given here shows mobile interface of the Cambridge, ANU and Sao Paulo University library websites.

Screenshot 4.83: Mobile interface of Cambridge University library website



Screenshot 4.84: Mobile interface for the Australian National University library website

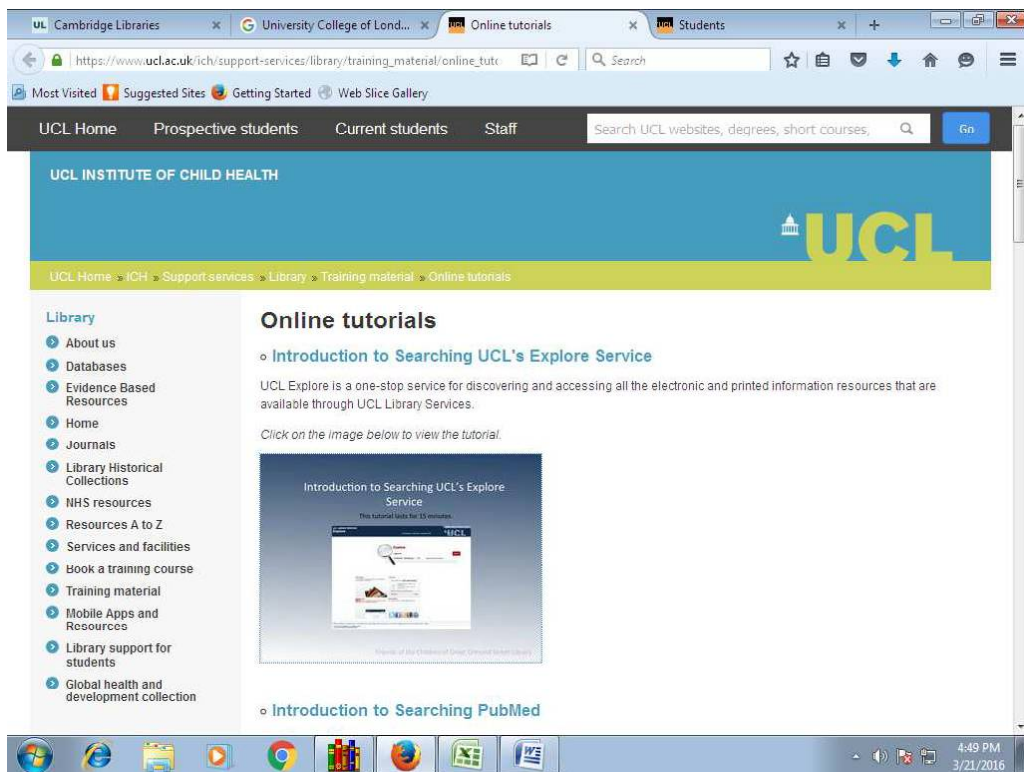


Screenshot 4.85: Mobile interface of Universidade de Sao Paulo library website

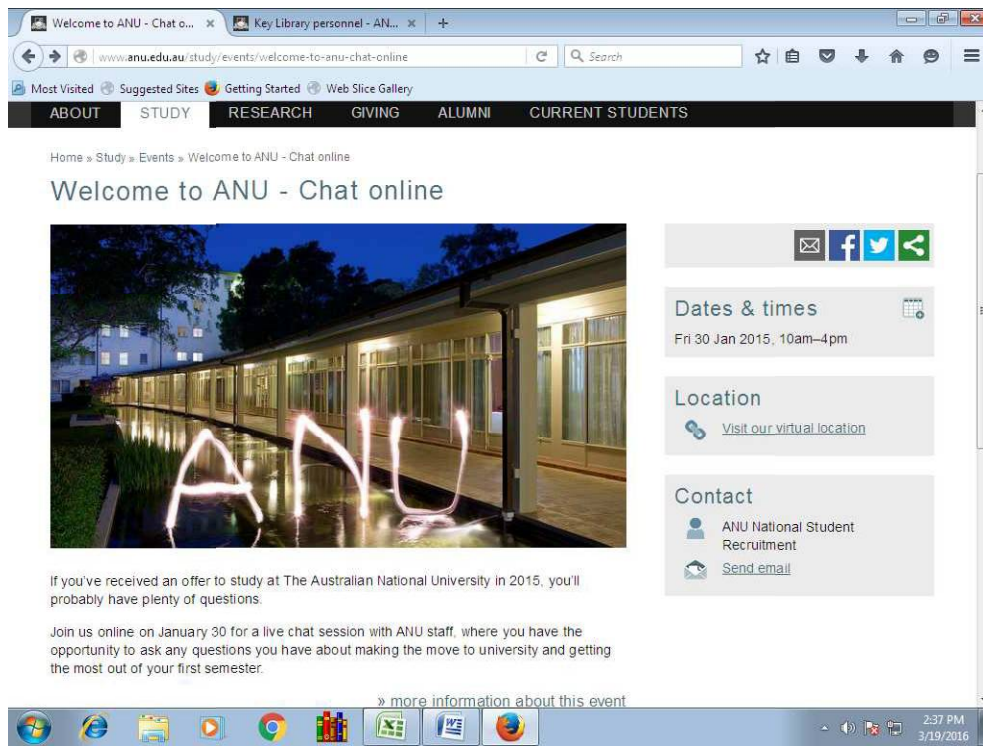


4.2.2.18. Live/Online Sessions: Many times it is not possible to conduct orientation and information literacy programs for all patrons because university has large number of patrons. On other side students or patrons are sometimes miss the orientation and information literacy programs organized by the library. Therefore few university libraries started to offer live online orientation classes or live sessions for patrons. With these students can attend these sessions from anywhere. The library invites patrons in advance to attend these online classes informing those dates and times. Few libraries keep these online tutorials or classes for future reference too. To attend live sessions helps patrons to clarify their doubts at that time. Screenshot 4.86 shows online tutorials of Cambridge University library; Screenshot 4.87 shows live sessions of ANU library and Screenshot 4.88 shows live orientation classes at the American University of Beirut library.

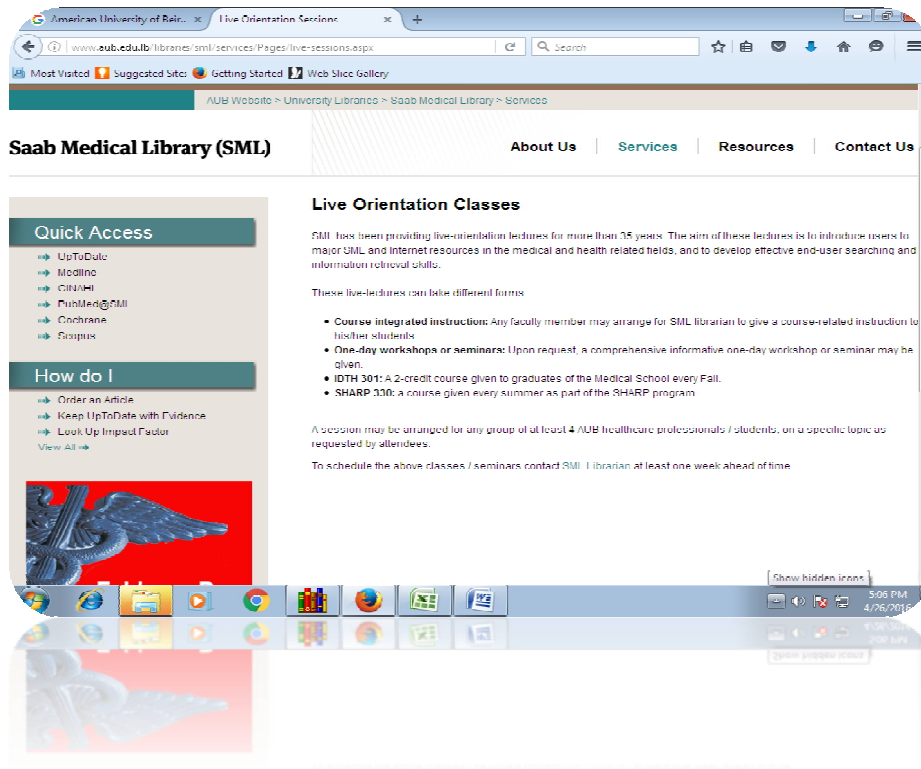
Screenshot 4.86: Online tutorials of University of Cambridge library



Screenshot 4.87: Live Chat sessions at the Australian National University library

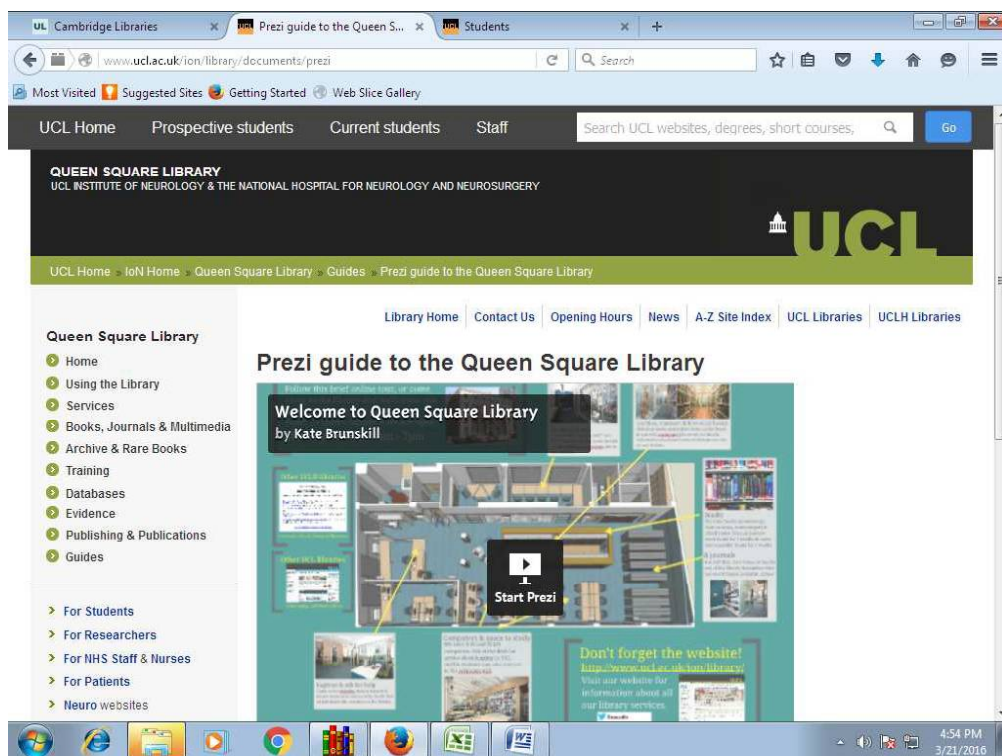


Screenshot 4.88: Live orientation classes at the American University of Beirut library

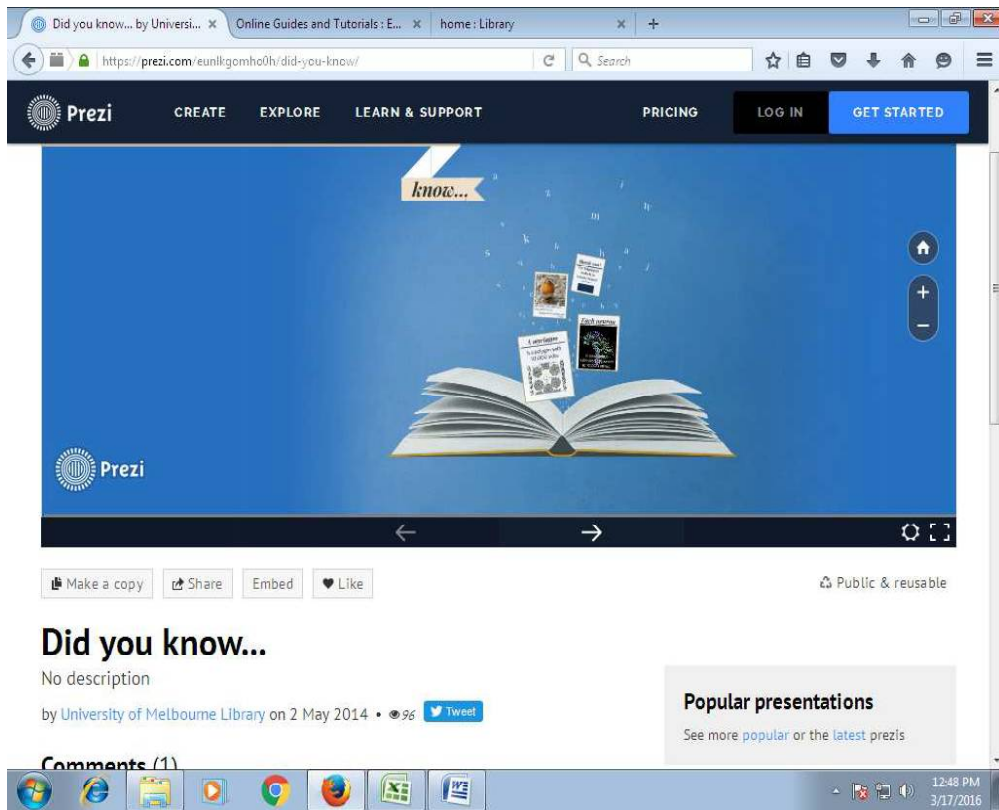


4.2.2.19. Prezi/Slide Share: Slide Share is a Web 2.0 based slide hosting service used widely in academic and research field to share and upload contents in PowerPoint, PDF, keynote or open document presentation format since 2006 (SlideShare). Similarly, Prezi is cloud based presentation software developed by Adam Somlai-Fischer as a tool for use in architecture in 2008. In traditional PowerPoint presentations users were able to move from one slide to another slide in a linear fashion, but with Prezi one can produce non-linear presentations where users can move between ideas and highlight key elements in the presentation. It is used to create stunning new presentations that make people remember your message and act on it. User can add data by simply typing text onto the canvas. Prezi bubble menu is used to import pictures, documents (Word, PDF), videos, graphs, library guides, maps, web pages for editing and preparing training sessions in University libraries (Morga, 2012). The Cambridge University library uses Prezi for library orientation and training presentations (Screenshot 4.89). Screenshot 4.90 shows use of Prezi at the University of Melbourne library, Screenshot 4.91 shows use of Prezi for tutorials like how to create personal research identifier at the University of Cape Town library.

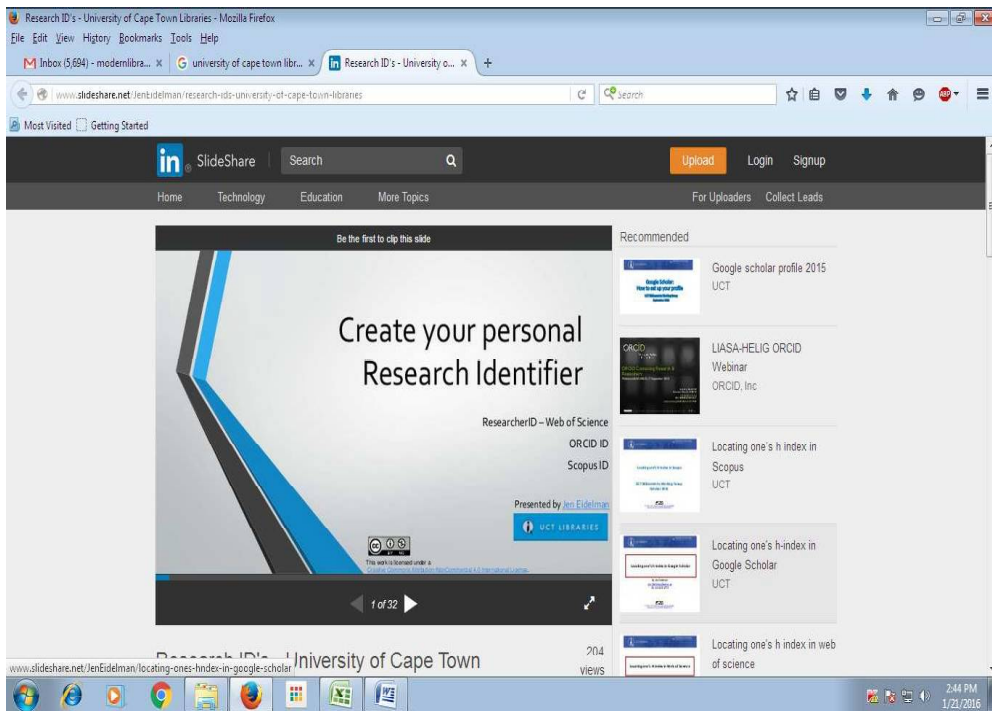
Screenshot 4.89: Use of Prezi at University of Cambridge's Queen Square Library



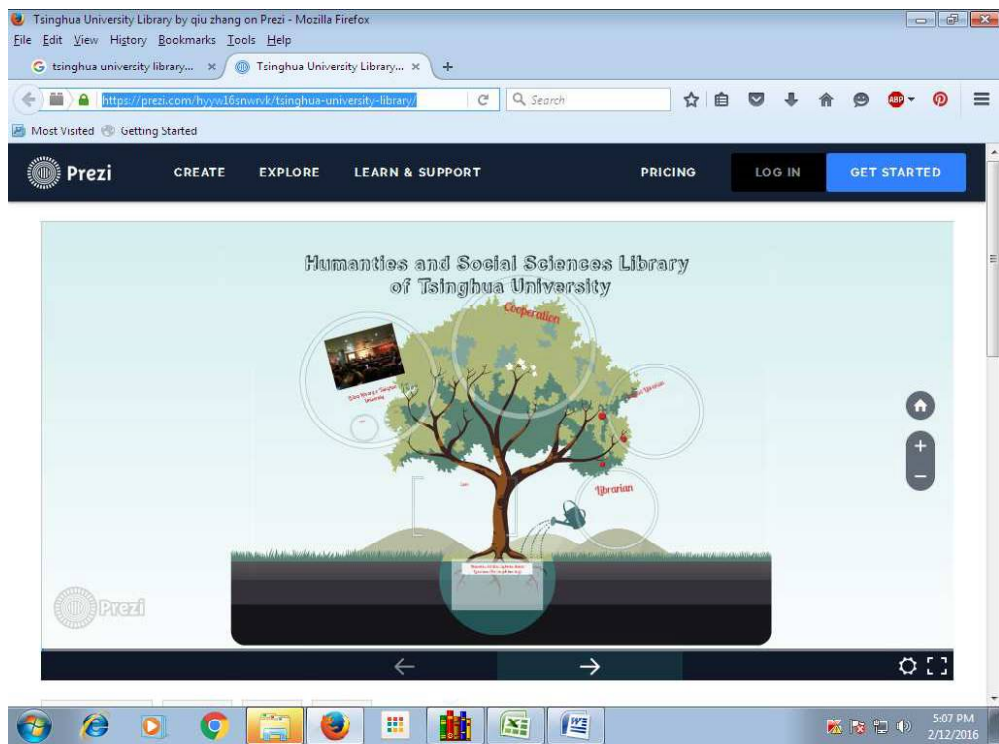
Screenshot 4.90: Use of Prezi at University of Melbourne library



Screenshot 4.91: Use of SlideShare at the University of Cape Town library

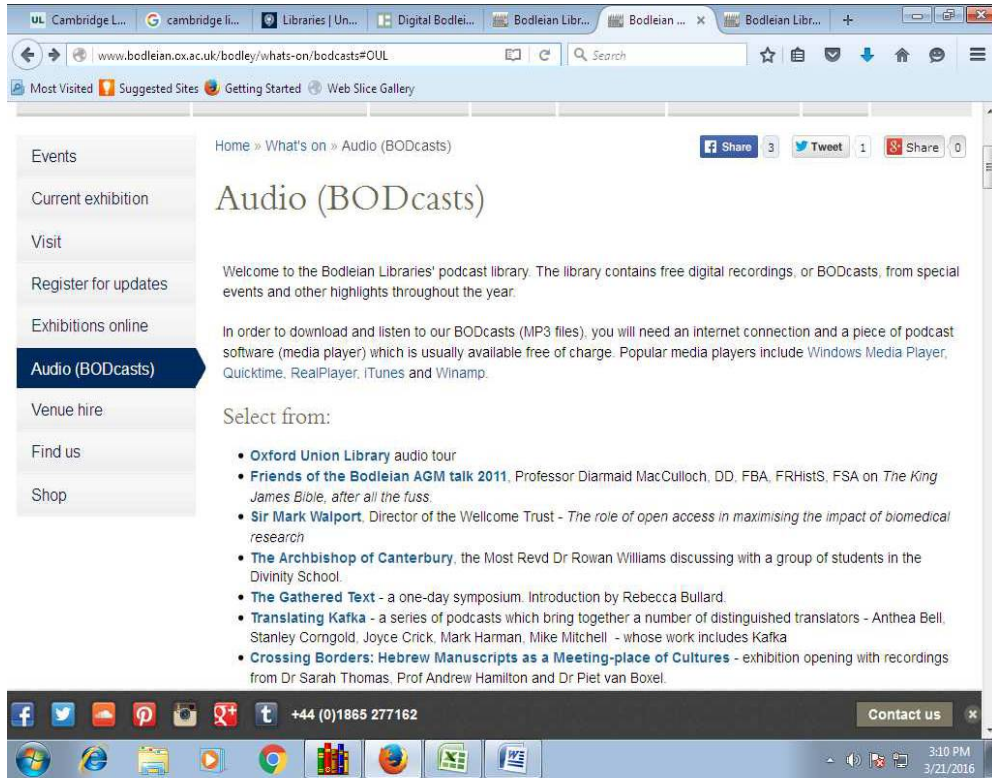


Screenshot 4.92: Use of Prezi at Tsinghua University library



4.2.2.20. Audio Tutorials: University Libraries use audio tutorials along with video tutorials for patron education. Audio tutorials are easy to prepare and share. Patrons can listen from iPod, mobiles, personal computer, and Mac and learn on their own. Screenshot 4.93 shows Oxford University library uses audio tutorials for library tour and it has made available downloadable MP3 files to their patrons.

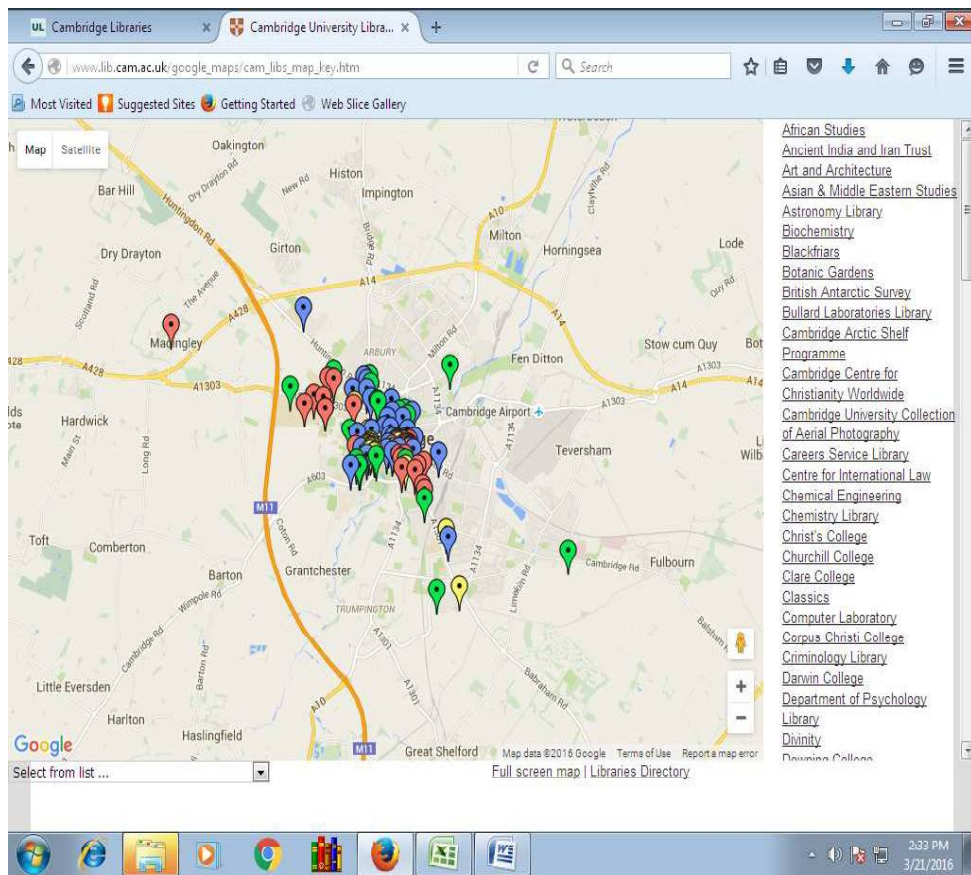
Screenshot 4.93: Audio tutorials/recordings at Oxford Bodleian libraries



4.2.2.21. Location maps/ Directions: In top universities, libraries are located at different locations within or outside the university premises. Therefore, to help newly admitted patrons to locate their library easily university libraries providing location maps on their website. Few university libraries not only give map of location, but also floor plan and collection maps too.

Screenshot 4.94 shows the Cambridge University libraries uses location map using Google map application and gave its link to their website. Screenshot 4.95 and 4.96 shows library floor map of King Abdulaziz University library and floor plan of the Cambridge University library.

Screenshot 4.94: Location maps of Cambridge University libraries



Screenshot 4.95: Library floor map of King Abdulaziz University library

KING ABDULAZIZ UNIVERSITY

العربية

MainPage

My Account

About the Library

The Administration

Library Branches

Library Hours

Library Guides

KAU's Journal

Arab Periodicals

Files

Favorite Websites

FAQ

Library.kau.edu.sa/Pages-myAccountE.aspx

Welcome to King Abdulaziz University (KAU) Library in Jeddah Saudi Arabia. This self-guided tour will introduce you to KAU Library's physical and virtual environment for finding and evaluating information and doing research. We highlight the features of the library building, and introduce our staff, collections, and Services .

Central Library

Special Library	Manuscripts	Official Publications	Public Relations	Special Collections
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Second Floor

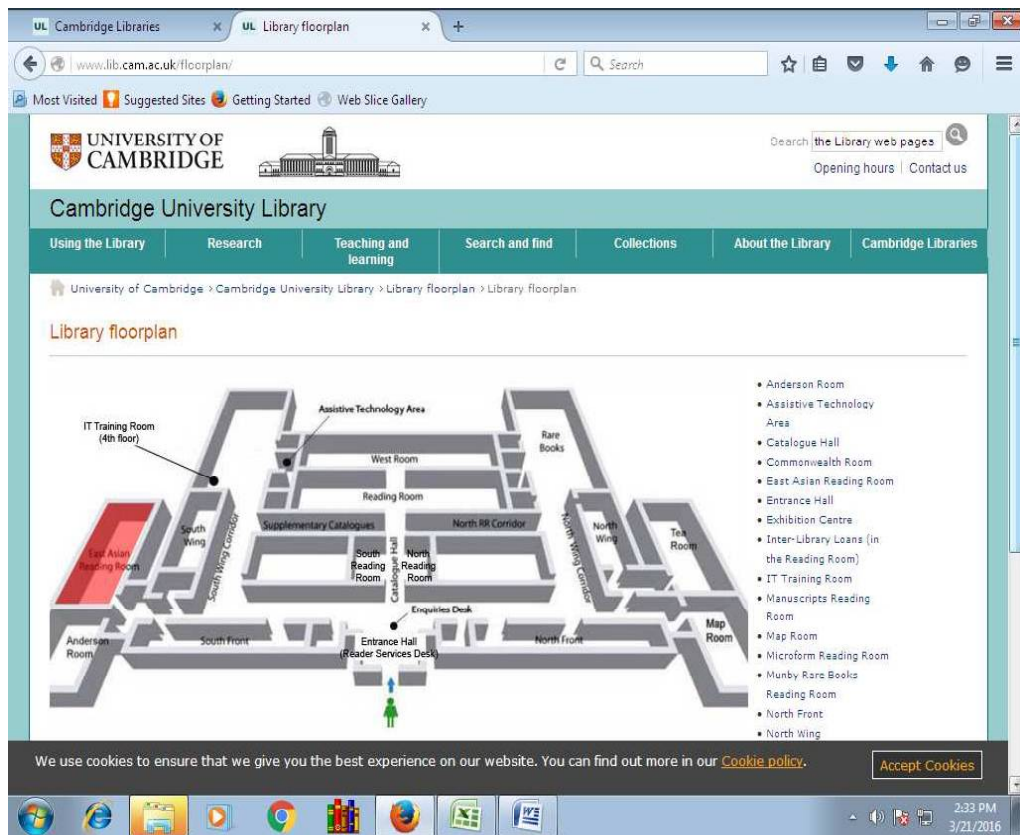
Gifts & Exchange	Periodicals	Accountant	Vice Dean's Office
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First Floor

English & Arabic Books	Mechanization	Development Vice's Office	Dean's Office	Tech- Procedures	E- Services	Pc Lab	References	User Services	Circulation
------------------------	---------------	---------------------------	---------------	------------------	-------------	--------	------------	---------------	-------------

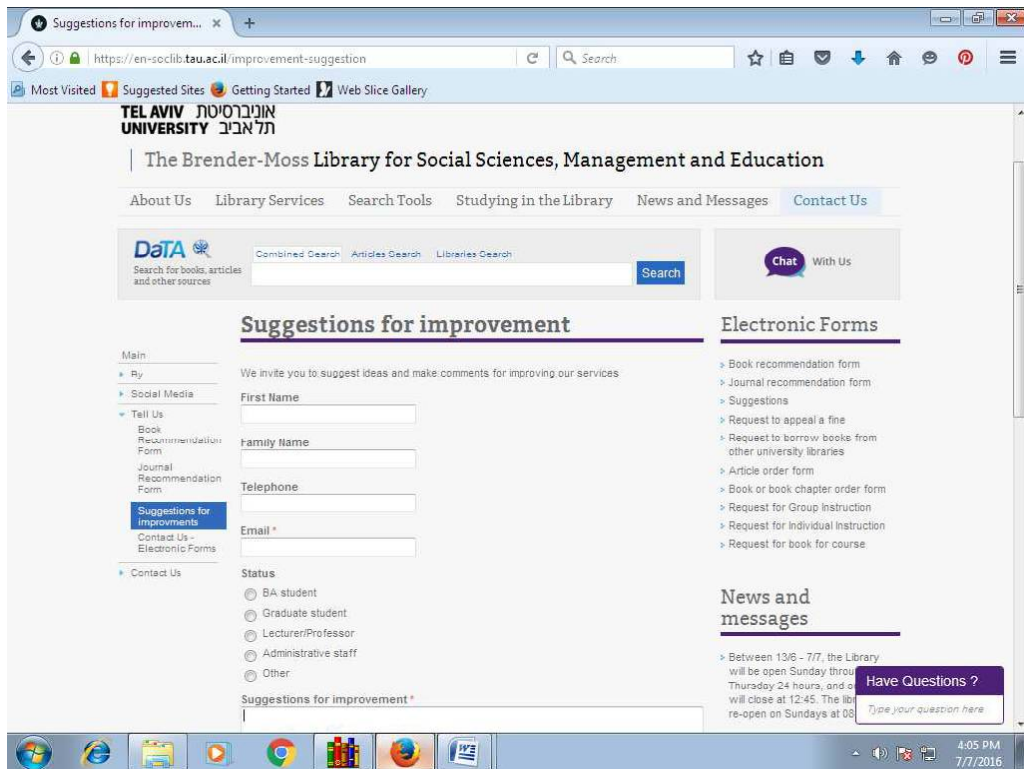
Ground Floor

Screenshot 4.96: Floorplan of the Cambridge University library

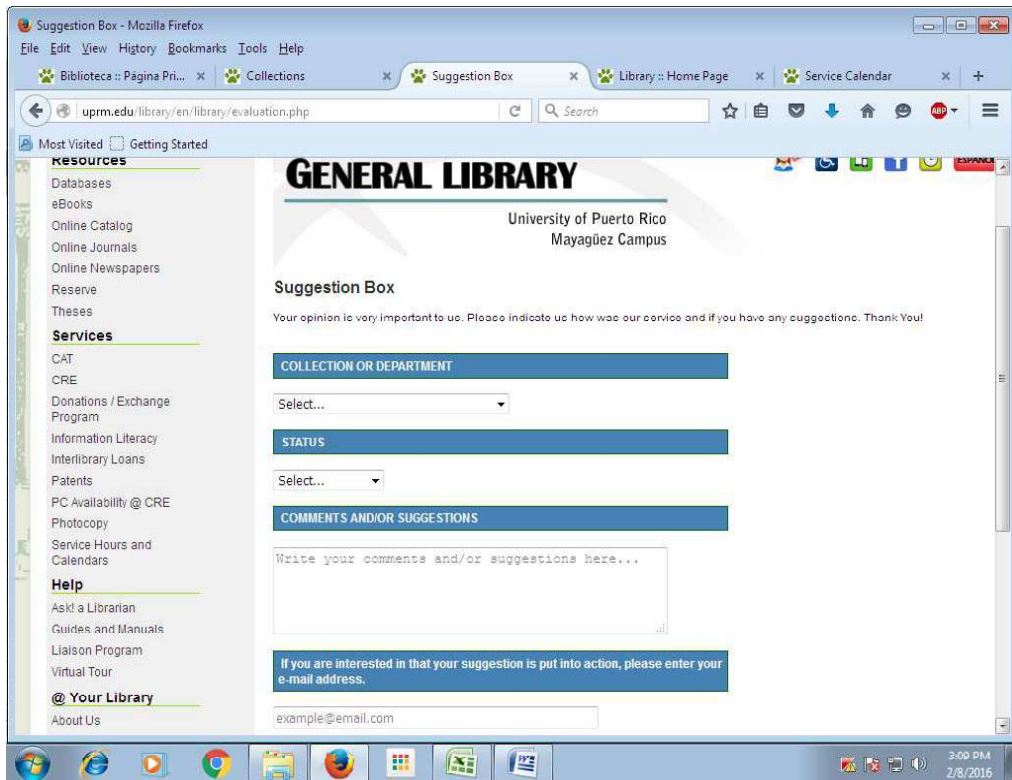


4.2.2.22. Feedback: Feedback is to put things right by taking a corrective action. It is regarded as a strong external stimulus providing positive or negative reinforcement to the behavior. Feedback in higher education must be concerned with developing new ways of knowing stakeholder demands and expectations. Feedback from patrons concerned with looking forward for correction, reinforcement, forensic diagnosis, benchmarking and longitudinal development than concerned with the work already carried out by University libraries (Price, Handley, Millar, & O'Donovan, 2010). Unlike traditional written feedback from now universities collect feedback online and have a database of feedback to work on it. On the library website feedback form is designed and patrons are asked to fill it (Screenshot 4.97). It is also called as a suggestion box (Screenshot 4.98) or it is a survey of user satisfaction. This database of suggestions (Screenshot 4.99) and feedback helps University libraries to improve their services.

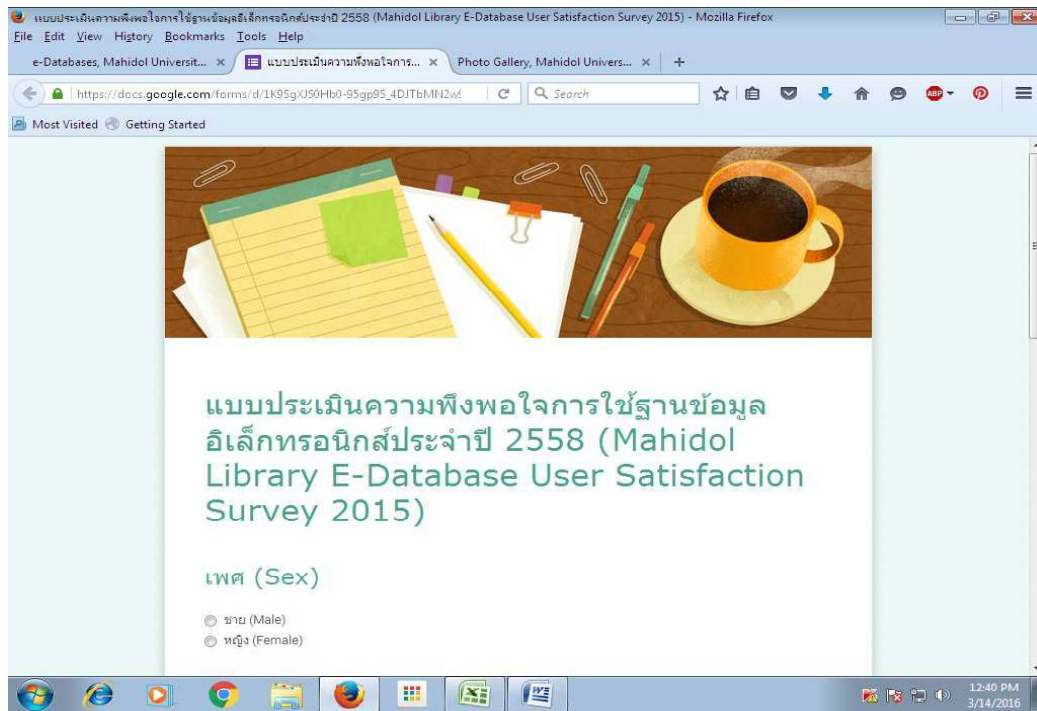
Screenshot 4.97: Online feedback of the Tel Aviv University library



Screenshot 4.98: Online suggestions of University of Puerto Rico library

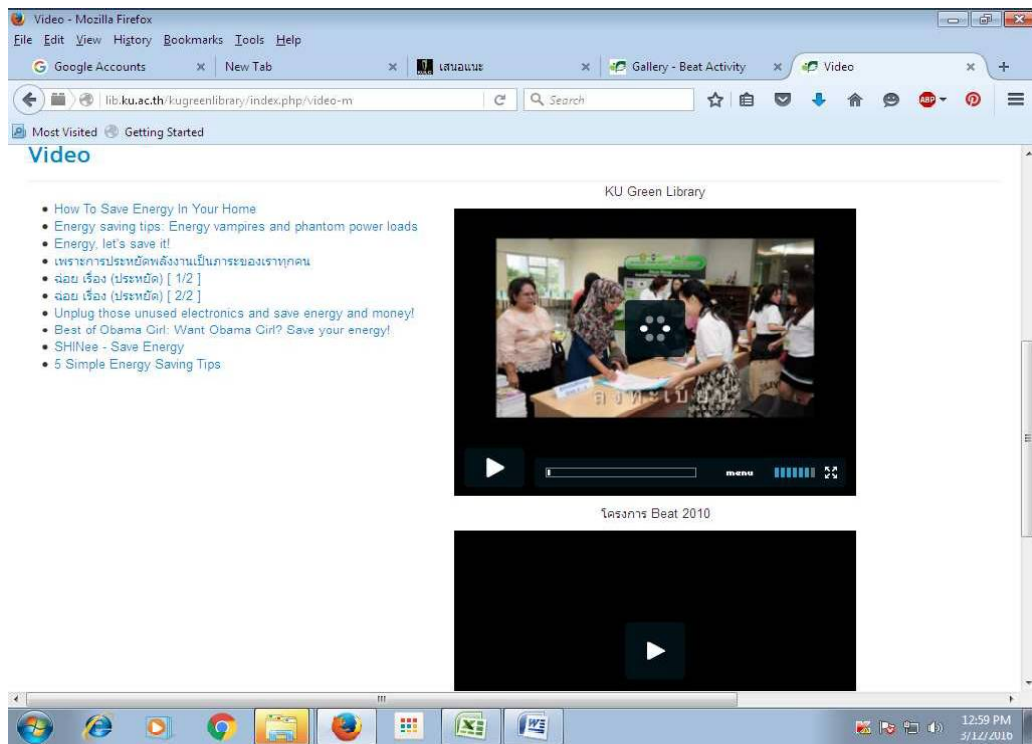


Screenshot 4.99: Online feedback of Mahidol University Library



4.2.2.23. Live/Online Videos Library: Few university libraries give access to live or online videos to educate patron online. To provide current awareness services and updating users this service is provided. The Kesetkart University library online video library screenshot 4.100 is given here for reference.

Screenshot 4.100: Online video library of Kesetsart University library



4.2.2.24. Library Calendar: Online library calendar is nothing but the preplanned tentative event planner and updated library opening hours during the week, month and year. Libraries update the event and working hours' time to time on their website. On the main university library website all connected libraries of that university are also listed. Below Screenshot 4.101 is an example of the American University of Beirut mentioned department wise of branch libraries timings and holidays. Screenshot 4.102 shows opening hours of both normal and special days during whole year. Complete year calendar they displays on their webpage. Screenshot 4.103, shows opening hours of different libraries under the Helsinki University day and date wise.

Screenshot 4.101: Library calendar of The American University of Beirut

The screenshot shows the 'Opening Hours' page for the American University of Beirut University Libraries. The page lists regular opening hours for five different libraries during the Fall and Spring Semesters. The hours are organized into a table with columns for Monday-Friday, Saturday, and Sunday.

	Monday-Friday	Saturday	Sunday
Jafet Library: Archives & Special Collections	8:00 am. - 5:00 pm.	closed	closed
Jafet Library: Circulation, Computer Lab, Reference, and Reserve Reading Room	7:30 am. - midnight	8:00 am. - 8:00 pm.	12:00 noon - midnight
Jafet Library: Serials Reading Room	7:30 am. - midnight	8:00 am. - 8:00 pm.	closed
Engineering & Architecture Library	8:00 am. - 9:00 pm.	8:00 am. - 5:00 pm.	closed
Science & Agriculture Library	8:00 am. - 9:00 pm.	8:00 am. - 5:00 pm.	closed

Screenshot 4.102: Library calendar of University of Pretoria

The screenshot shows the 'Library hours for 2016' page from the University of Pretoria. It features two main tables: 'Normal Hours 2016' and 'Special Hours'. The 'Normal Hours' table shows weekly schedules for various libraries, while the 'Special Hours' table provides a detailed calendar view for specific dates in 2016.

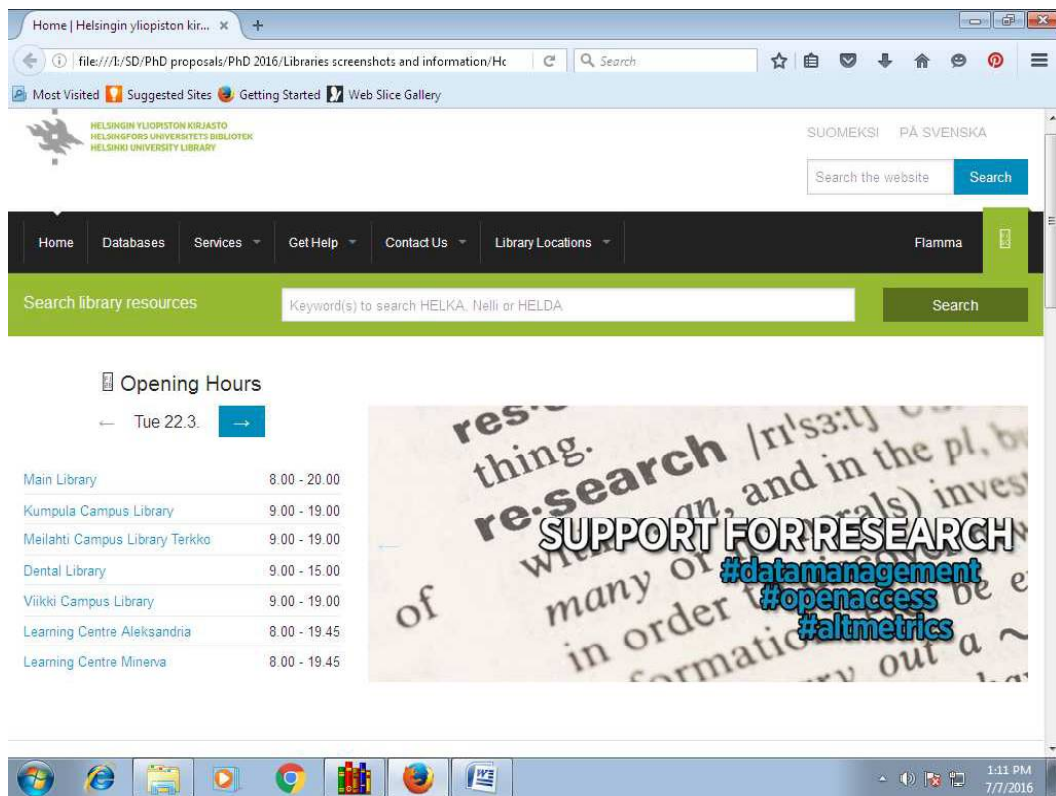
Normal Hours 2016

	Main	Law	Groenkloof	Health	BMS & Dentistry	Music	Veterinary Sciences	Mamelodi
Mo, Wed, Th	7:00 - 21:00	7:30 - 21:00	7:30 - 21:00	7:30 - 20:00	7:30 - 17:00	7:30 - 19:00	7:30 - 18:00	7:30 - 18:00
Tue	8:30 - 21:00	8:30 - 21:00	8:30 - 21:00	8:30 - 20:00	8:30 - 17:00	8:30 - 19:00	8:30 - 18:00	8:30 - 18:00
Fr	7:00 - 20:00	7:30 - 20:00	7:30 - 20:00	7:30 - 19:00	7:30 - 16:00	7:30 - 16:00	7:30 - 18:00	7:30 - 16:00
Sat	8:30 - 13:00	8:30 - 13:00	8:30 - 13:00	8:30 - 14:00	Closed	9:00 - 13:00	8:30 - 12:30	8:00 - 13:00

Special Hours

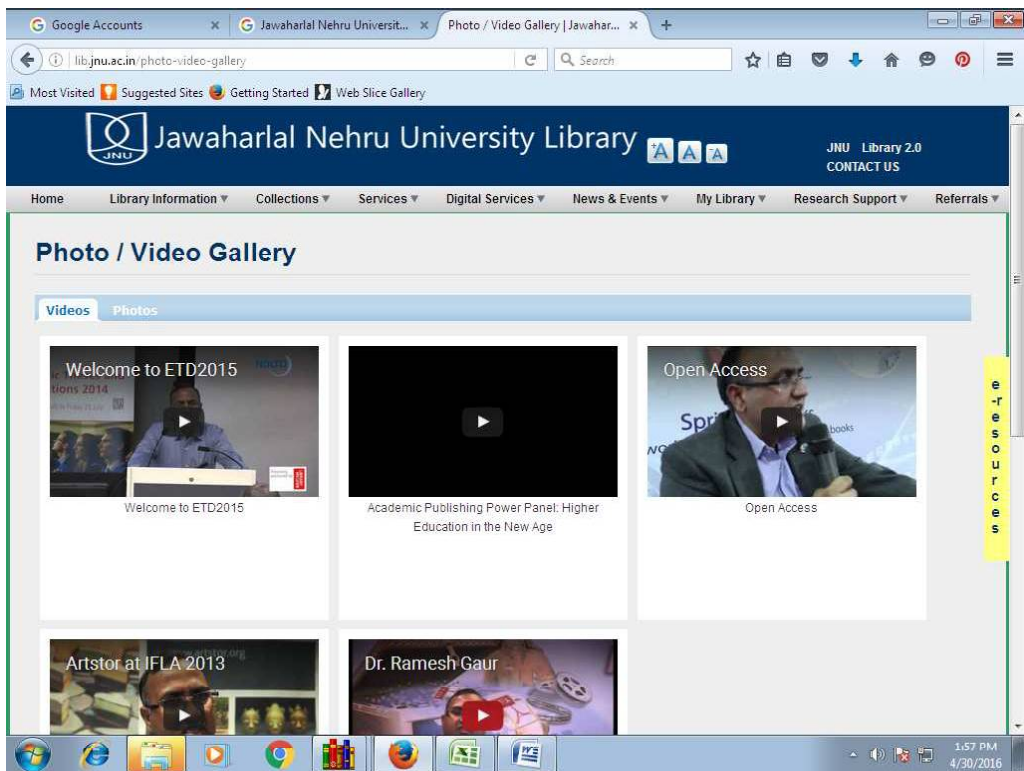
	Main	Law	Groenkloof	Health	BMS & Dentistry	Music	Veterinary Sciences	Mamelodi
04/01/2016 to 09/01/2016	Mo - Fr 7:30 - 16:00	7:30 - 16:00	7:30 - 16:00	7:30 - 19:00	7:30 - 16:00	7:30 - 16:00	7:30 - 16:00	7:30 - 16:00
	Tue 8:30 - 16:00	8:30 - 16:00	8:30 - 16:00	8:30 - 19:00	8:30 - 16:00	8:30 - 16:00	8:30 - 16:00	8:30 - 16:00
	Sat Closed	Closed	Closed	8:30 - 13:00	Closed	Closed	Closed	Closed
11/01/2016 to 16/01/2016	Mo - Fr 7:30 - 16:00	7:30 - 16:00	7:30 - 16:00	7:30 - 19:00	7:30 - 16:00	7:30 - 16:00	7:30 - 18:00	7:30 - 16:00
	Tue 8:30 - 16:00	8:30 - 16:00	8:30 - 16:00	8:30 - 19:00	8:30 - 16:00	8:30 - 16:00	8:30 - 18:00	8:30 - 16:00
	Sat 8:30 - 13:00	8:30 - 13:00	8:30 - 13:00	8:30 - 13:00	Closed	Closed	8:30 - 12:30	Closed
18/01/2016 to 23/01/2016	Mo - Fr 7:30 - 18:00	7:30 - 18:00	7:30 - 18:00	7:30 - 19:00	7:30 - 16:00	7:30 - 16:00	7:30 - 18:00	7:30 - 16:00
	Tue 8:30 - 16:00	8:30 - 16:00	8:30 - 16:00	8:30 - 19:00	8:30 - 16:00	8:30 - 16:00	8:30 - 16:00	8:30 - 16:00
	Sat 8:30 - 13:00	8:30 - 13:00	8:30 - 13:00	8:30 - 13:00	Closed	Closed	8:30 - 12:30	Closed

Screenshot 4.103: Library Calendar of Helsinki University

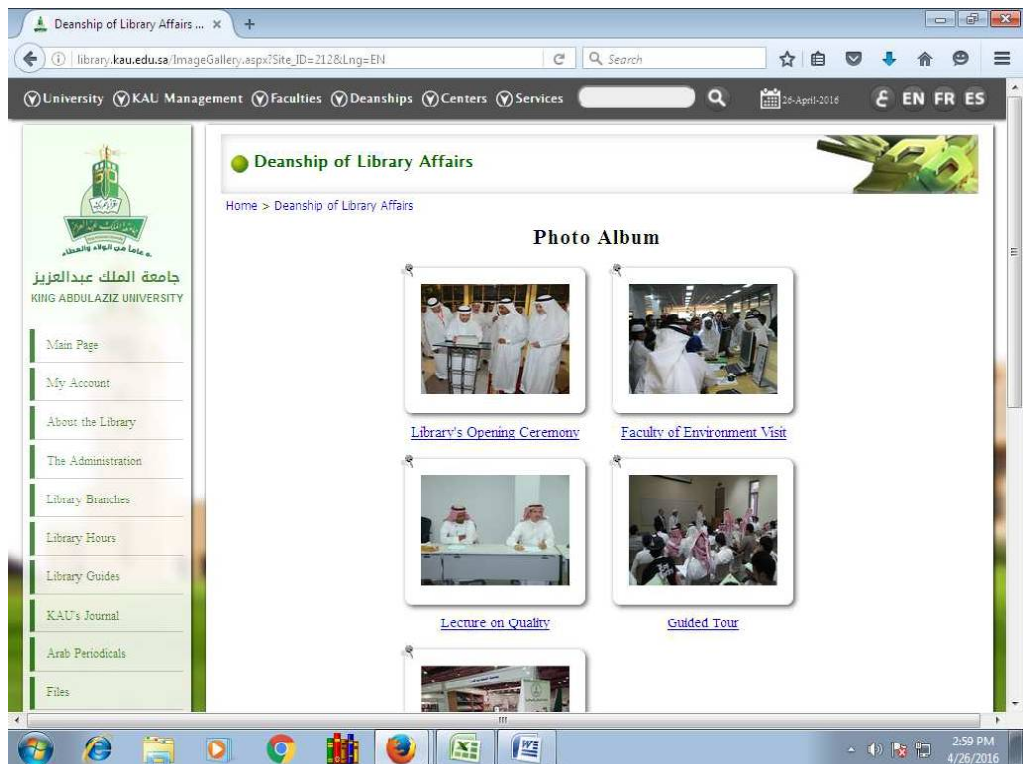


4.2.2.25. Photo Gallery: University Libraries provide photos of library infrastructure, different sections, events, etc. in the form of an album or scrolling photos. Displaying photos of services and sections are more attractive, catchy and easy to understand by, the patrons than giving description in text form. It also helps to market library services and attract readers. Many university libraries publish albums of events they organized in the library on their website. Screenshot 4.104 shows photo gallery of library events and programs organized by the Jawaharlal Nehru University library from India. Screenshot 4.105 shows the photo gallery of different projects of Green Library of Kesetsart University library.

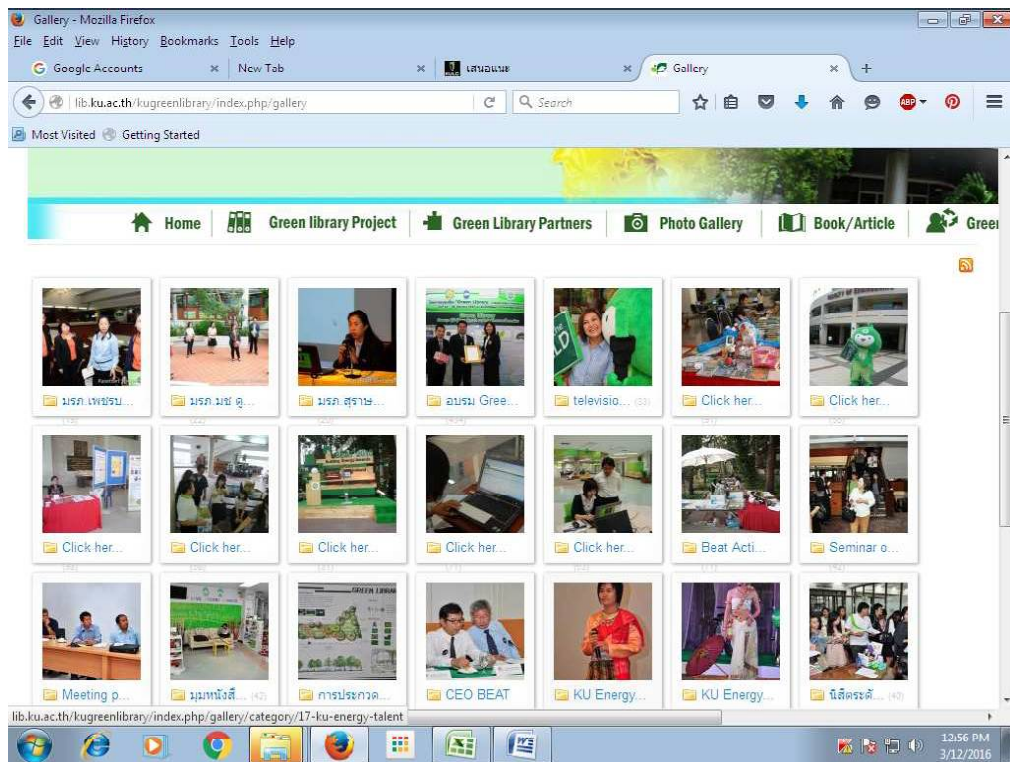
Screenshot 4.104: Photo gallery of Jawaharlal Nehru University library



Screenshot 4.105: Photo gallery of King Abdul Aziz University library

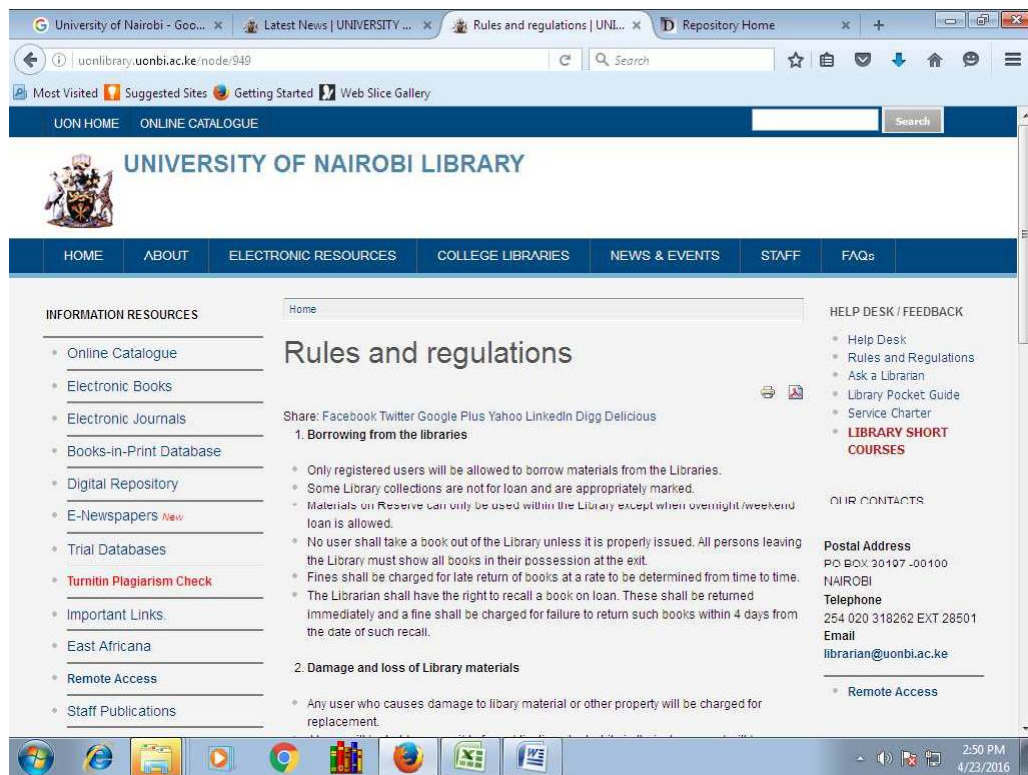


Screenshot 4.106: Photo gallery of Kesetsart University library

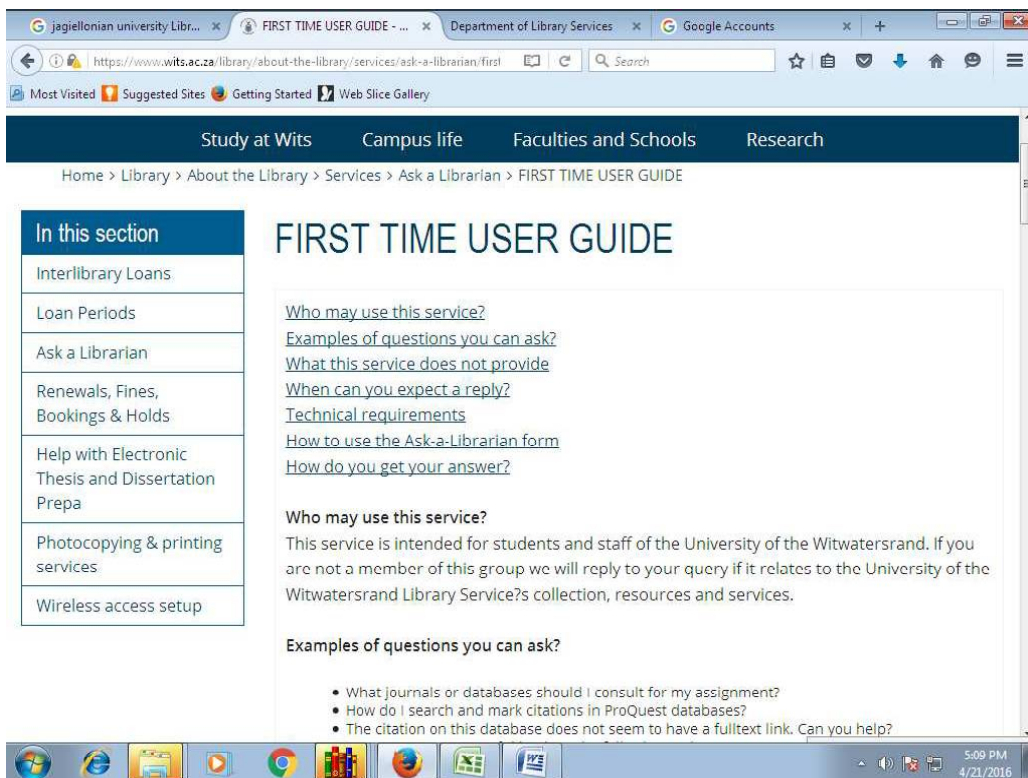


4.2.2.26. Text Instructions: This is very simple and basic way of providing information about library rules and regulations, timings, user guides, services and facilities in text html form. University libraries provide video and audio tutorials, PDF, PPTs and along with in detail they explain the procedure also to educate patrons. Examples of the University of Nairobi (Screenshot 4.107) and University of Witwatersrand library websites stating rules and regulations of that library and library instructions are given here.

Screenshot 4.107: Instruction (rules and regulations) of University of Nairobi Library



Screenshot 4.108: Library instructions on the University of Witwatersrand website



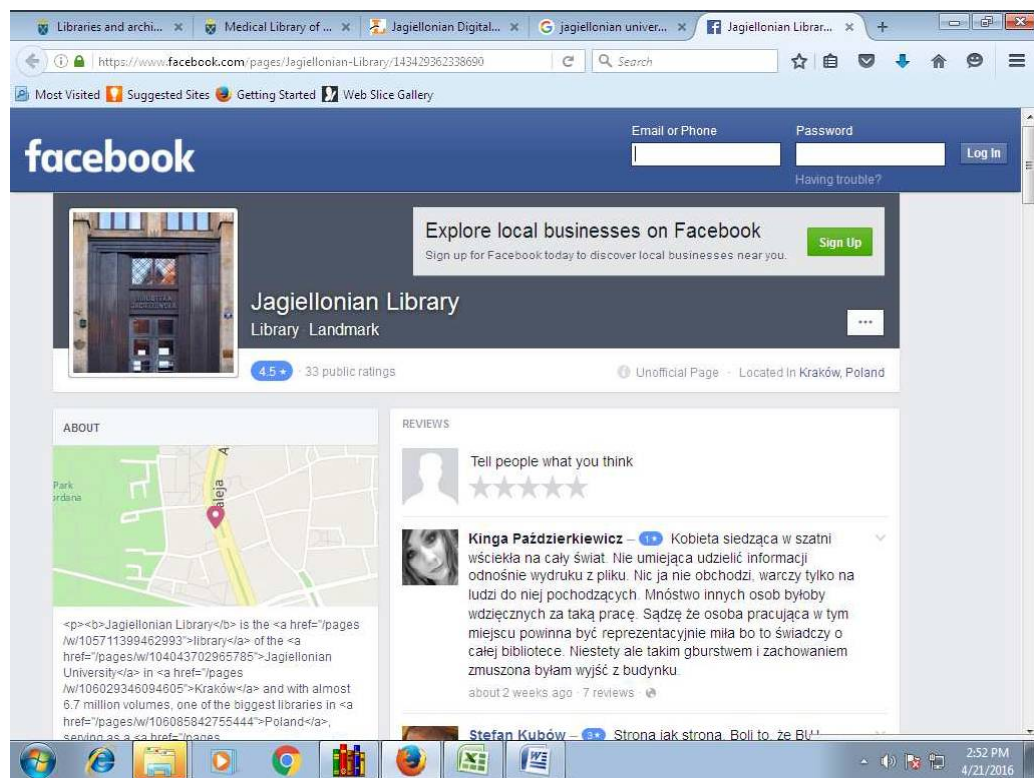
4.2.3. WEB-BASED PATRON COMMUNICATION TOOLS: The second cluster was related to services, tools and techniques used for patron education through the web. This third cluster is formed to know which better communication tools are being used by top university libraries in the world. Most of the previous studies are done on social networking sites and Web 2.0 technologies covered the uses of these tools in libraries. This cluster contains uses of Facebook, Twitter, email, Tumblr, Stumbleupon, LinkedIn, Flickr, Pinterest, iTunes, Instagram, Delicious, Google+, Foursquare and WhatsApp social communication tools in the selected university libraries. Below are given details along with examples.

4.2.3.1. Facebook: The use of social networking site/ web 2.0 applications Facebook is becoming more popular and widely used in university libraries as percentage of patrons using Facebook is very high and they can easily connect with libraries through Facebook. Building a network of patrons has become very easy because the university has patron database. University libraries are using Facebook for disseminating information, opening hours, notices, new arrivals, online current awareness and reference services, library facilities, updates of events, and to educate patrons. It also helps university to create a discussion forum and collect feedback from patrons, share book reviews, event photos, videos, links, and attract patrons towards library and market library services. Awang (2012) this application helps to forge relationships among library users.

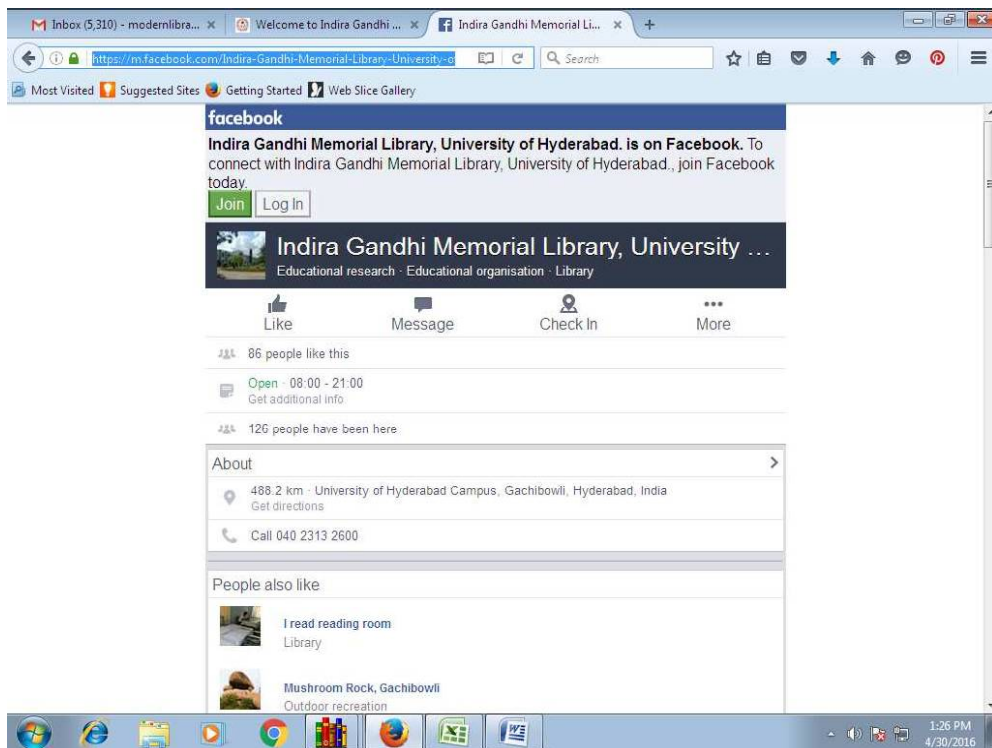
Screenshot 4.109: Facebook page of the University of Pretoria



Screenshot 4.110: Facebook page of the Jagiellonian Library

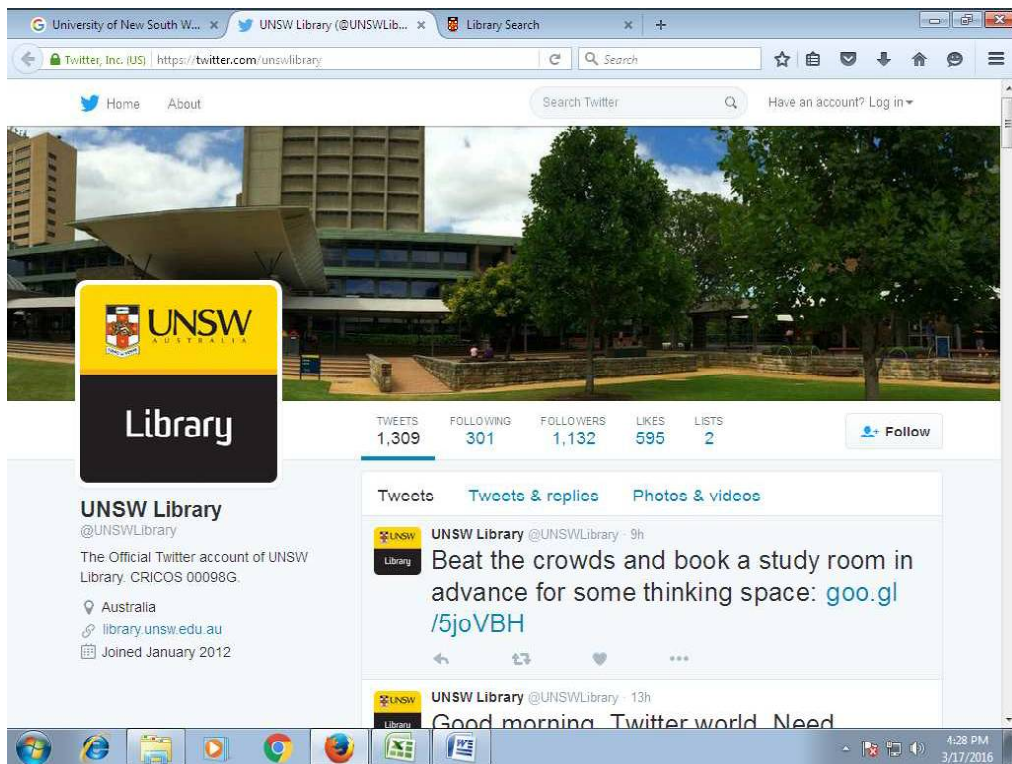


Screenshot 4.111: Facebook page of University of Hyderabad library

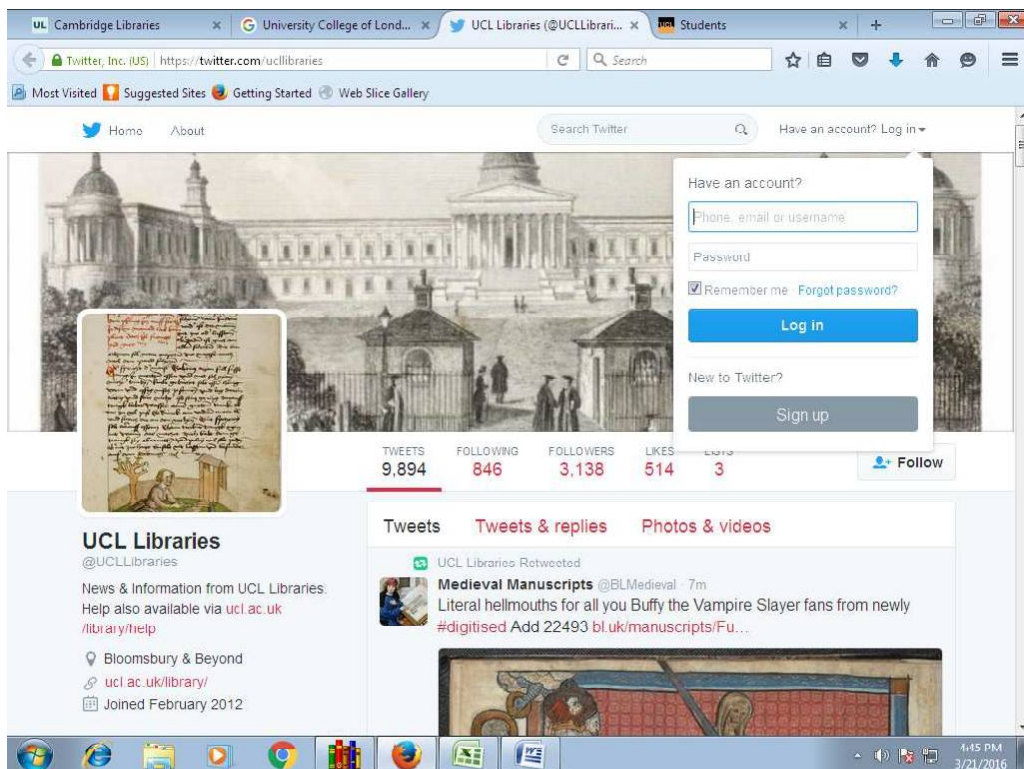


4.2.3.2. Twitter: Twitter is a real-time information network that connects users to the latest updates, ideas, opinions and news about what patrons find interesting. It allows patrons to re-tweet, reply, like and open the tweet (Awang, 2012). As it is a free service to send or receive short messages (max 140 characters) via the web or SMS using mobile phone, libraries can make good use of this service without spending much time or effort to connect with patrons (Milstein, 2009). University libraries use this web platform to send short messages about news and events they organize like readings, lectures and book sales, new arrivals with cover pictures, changes in library hours or links to new interesting stories about literacy, to share videos or information about new as well as existing library services and facilities (Dhande, 2014). Twitter feeds are broadcasted on the home page of library website or virtual learning environment (Loughran & Miller, 2012). Different sections of library offers services related to their section on twitter, e.g. about research support or platform, opening hours, archives, exhibitions, notification of upcoming conferences, seminars, workshops, etc.

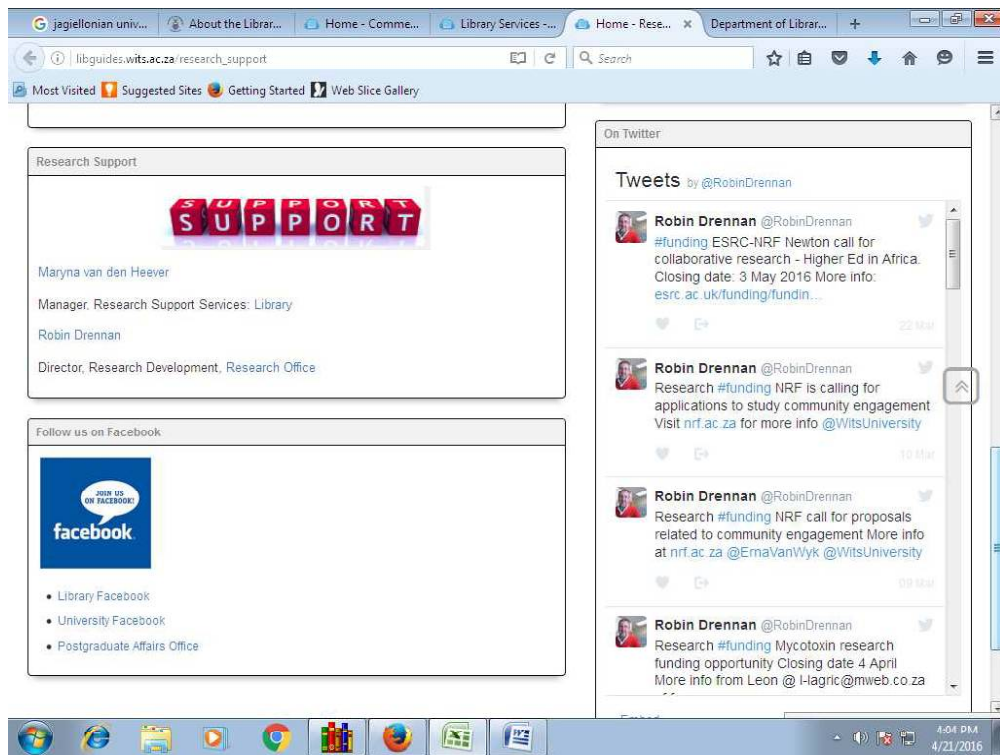
Screenshot 4.112: Twitter account of the University of New South Wales library



Screenshot 4.113: Twitter account of the University of Cambridge library

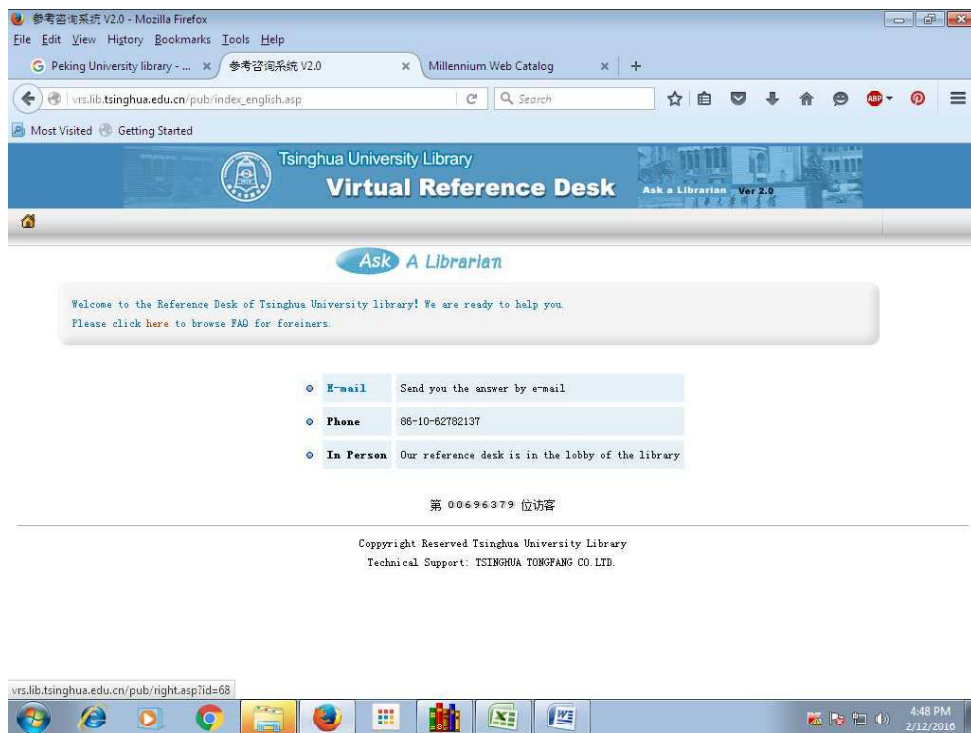


Screenshot 4.114: Tweets of the University of Witwatersrand website



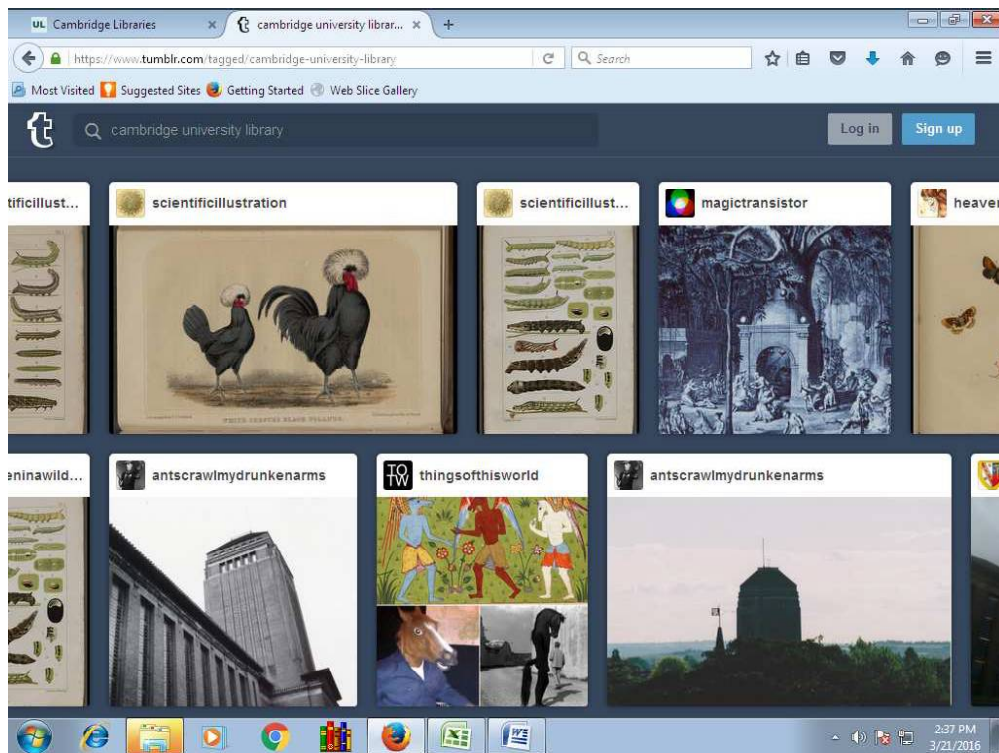
4.2.3.3. Email: Communication plays an important role in delivering web based library services. Email is a web based media to provide current awareness services to patrons. Almost all university libraries inform email id of concern department or service staff to the patrons on their website. From a service point of view providing contact details of staff must be available to all in case of emergency service. Patrons can contact staff by email or phone if they need any information or have questions about library services or facilities or want to give feedback. Librarians need to be more prompt to reply the email queries. University libraries have different Google groups for providing CAS to different categories of patron (Hatua).

Screenshot 4.115: Email service of Tsinghua University library

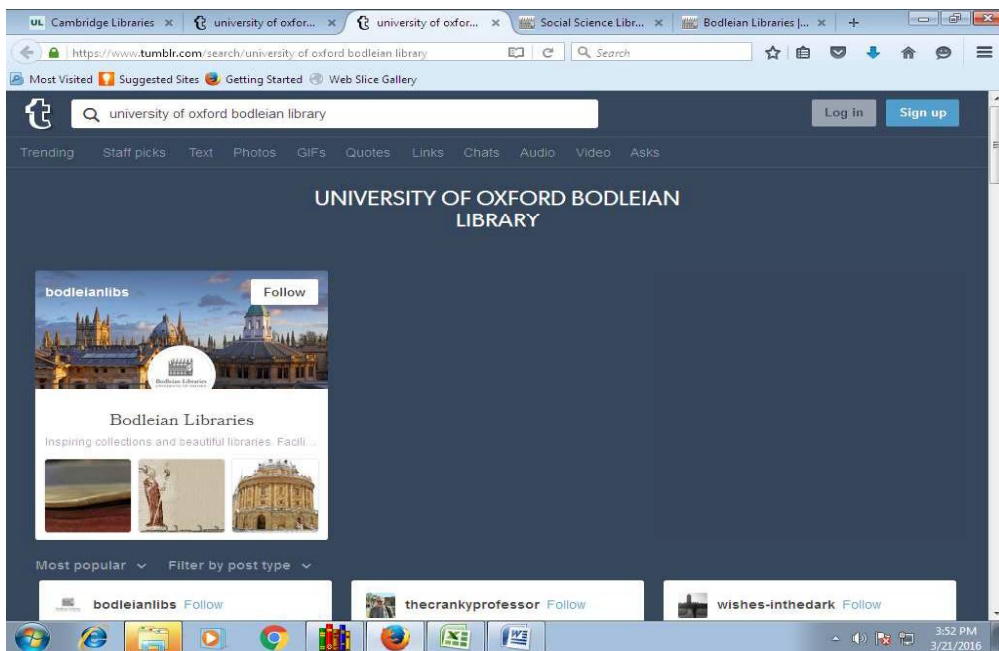


4.2.3.4. Tumblr: Tumblr is a blogging platform and can extend the virtual reach of a library website and, services by sharing archival resources, digital collections, books, and special event notices. It can increase the diversity of the audience accessing these university resources via social media accounts. To post pictures of library infrastructure, different sections this tool is used in many university libraries. It helps external audiences to discover library collections and communicate with library representatives on the other side, it helps libraries to publicize services and resources and harness the power of social media to connect patrons to collections, people, and resource. Recently since 2014 university libraries are started using this platform(Welch, 2014).

Screenshot 4.116: Tumblr account of the Cambridge University library



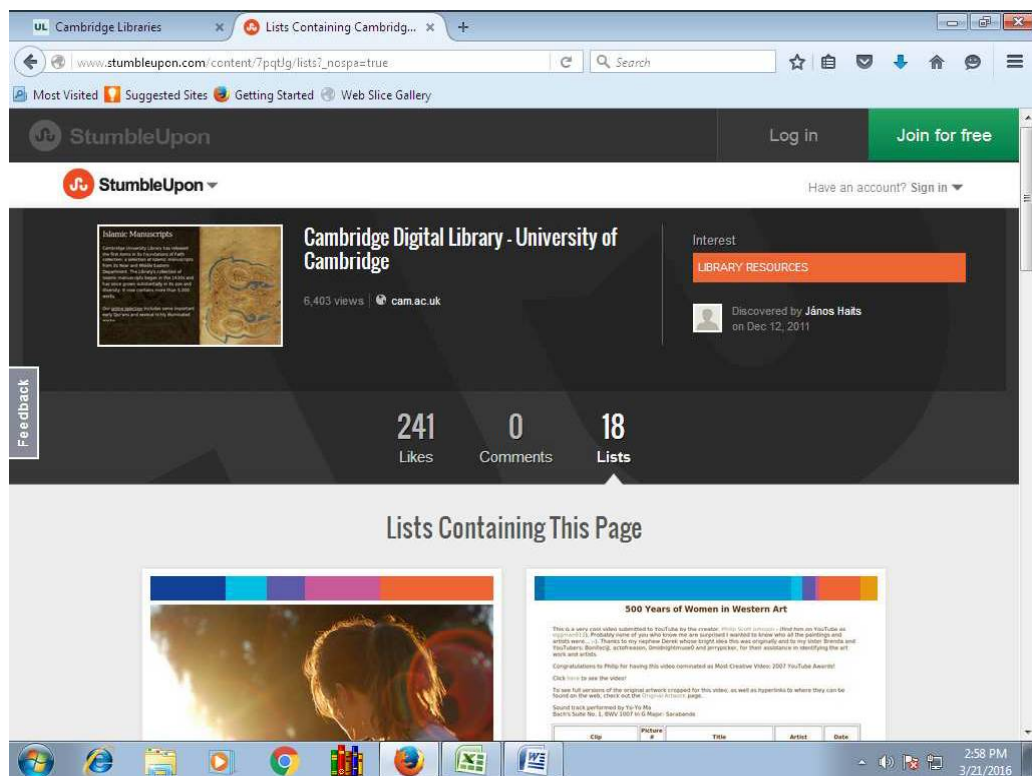
Screenshot 4.117: Tumblr account of the University of Oxford library



4.2.3.5. Stumbleupon: StumbleUpon is a discovery engine that finds and recommends web content to its users (Stumbleupon). It's a powerful way to discover our

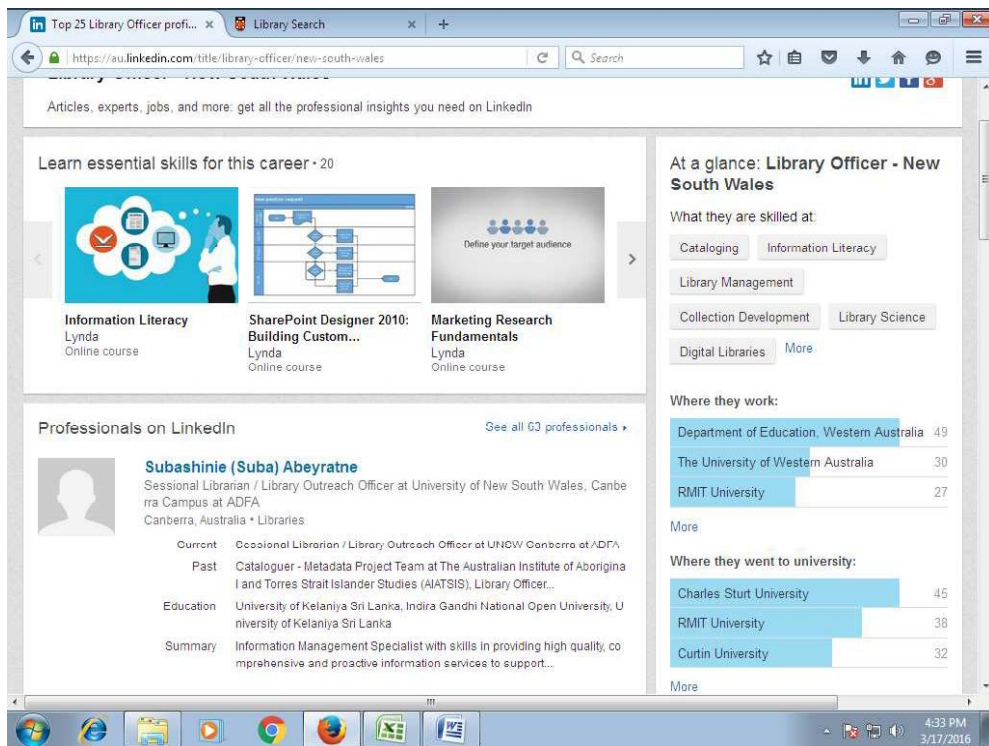
favorite web content like web pages, photos and videos that are personalized to their tastes and interests using peer-sourcing and social-networking principles (Stumbleupon) University libraries are using this platform to share photos, videos, article, quotes, news, location maps, resources, websites, blog, newsletters etc. to rate them and make them best content to refer by the world and patrons.

Screenshot 4.118: Stumbleupon account of the Cambridge University Digital Library

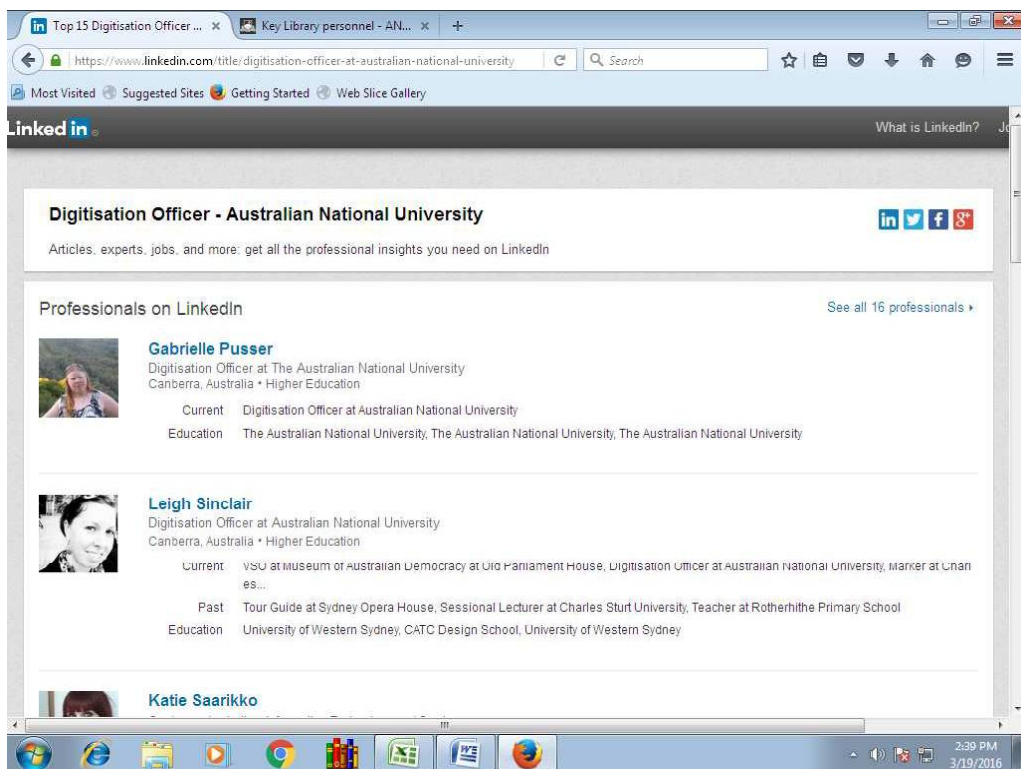


4.2.3.6. LinkedIn: LinkedIn is the world’s largest professional network with more than 433 million members in 200 countries and territories around the globe launched in 2003. The main mission of LinkedIn is to connect people to make them more productive and successful (Joyce, 2013). University library staff creates their professional profile on LinkedIn and communicates their activities and connects with professional globally. Also, they connect with their staff and students. Many university libraries created groups on LinkedIn. Few examples are given in Screenshot 4.119 & 4.120

Screenshot 4.119: LinkedIn profiles of library staff of University of New South Wales

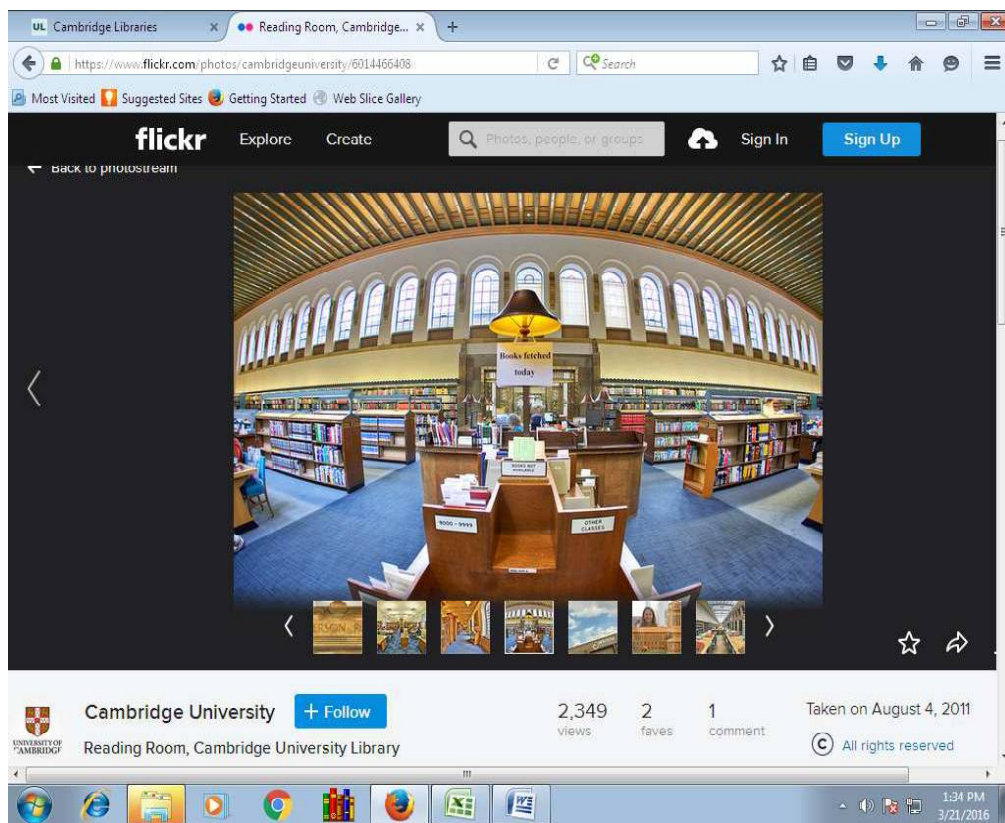


Screenshot 4.120: LinkedIn profiles of library staff of the Australian National University

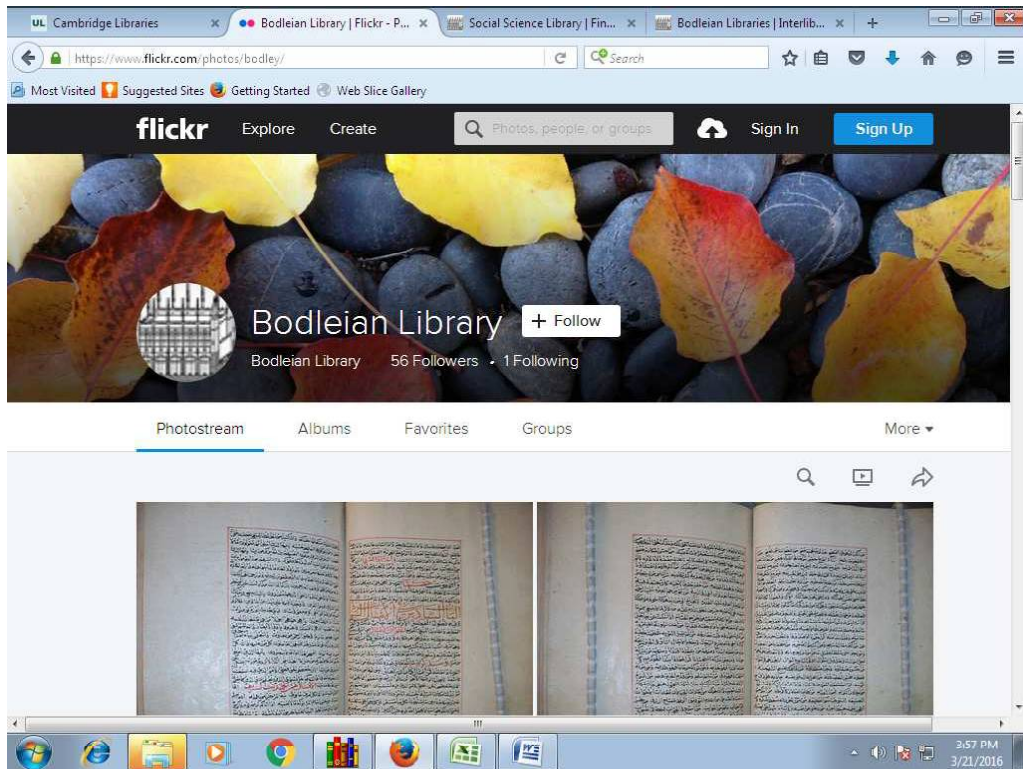


4.2.3.7. Flickr: University Libraries are using Flickr to market their services and upload pictures of different sections and surroundings of libraries to demonstrate library collection and resources. Sometimes Flickr tags publicly held photography too. Flickr highlights library current events, historical photos of libraries and its collection and displays visual library visit or tour, etc. Libraries can get feedback or comments too on Flickr. In below screenshots Cambridge university Flickr showing reading room and different sections of library, Mahidol university library uploaded pictures of events they organized and Bodleian libraries uploaded its archive of rare collection of manuscripts.

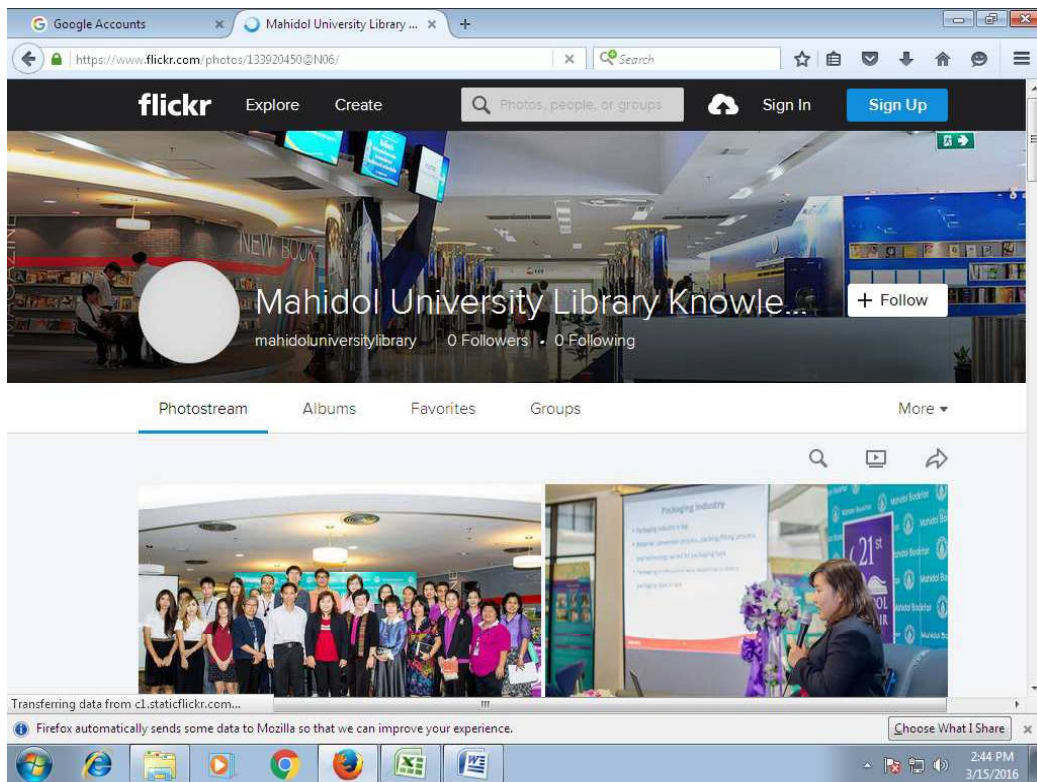
Screenshot 4.121: Flickr account of Cambridge University library



Screenshot 4.122: Flickr account of University of Oxford library

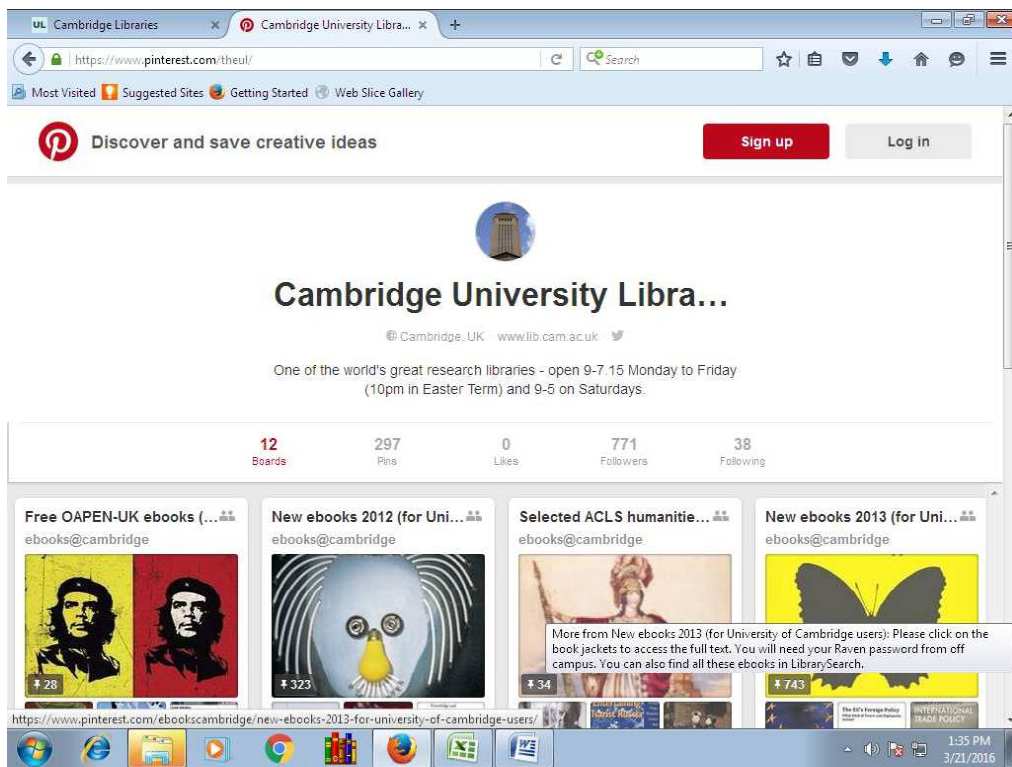


Screenshot 4.123: Flickr account of the Mahidol University library

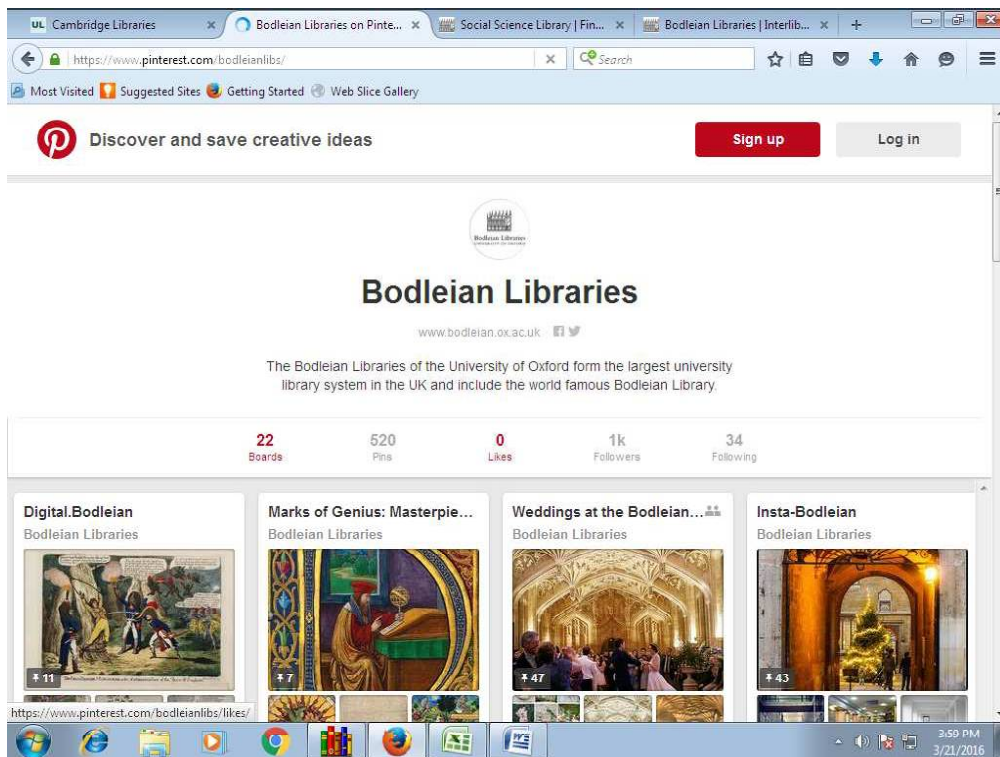


4.2.3.8. Pinterest: It is a pin-board style photo sharing website that gives the libraries an opportunity to create images collection depending on the theme like library events, special collection, library infrastructure photos, etc. It is one of the web based marketing service used by top university libraries to showcase their services and collection for their users. Pinterest account of the Cambridge University library showcasing their ebooks collection is shown in the Screenshot 4.124 and Screenshot 4.125 shows the Oxford University libraries Pinterest account.

Screenshot 4.124:Pinterest account of the Cambridge University library



Screenshot 4.125: Pinterest account of the Bodleian libraries of Oxford University

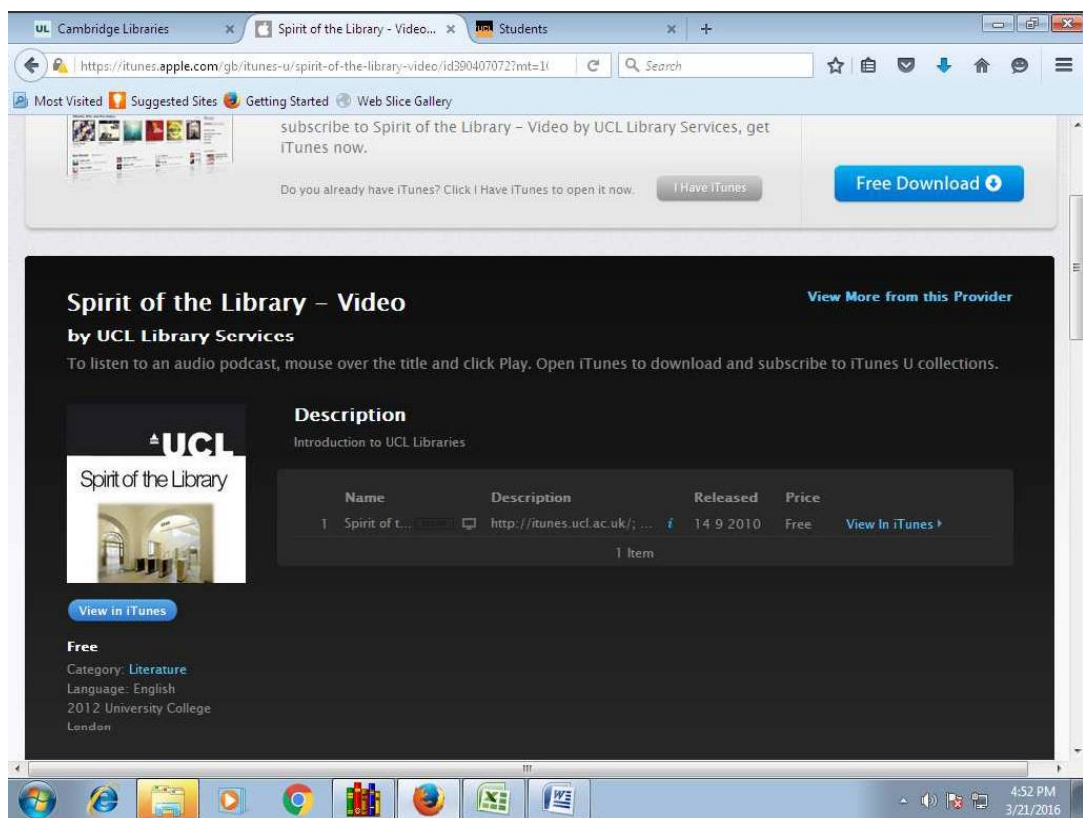


4.2.3.9. iTunes: The iTunes is designed as a service for university libraries to organize, manage their audio, videos and PDF content, pictures, screenshots, lessons, audio books and make it available easily and quickly to their users. It is an innovative way to engage and empower patrons to accommodate the digital lifestyle and personal learning needs. Patrons can listen and view the audio or video tutorials and other audio learning material on their computer, iPod or smart phones (iTunes U user's guide, 2006). Library staff shares audio or video tutorial they prepared to train and to give instructions to patrons, services and collection to patrons to learn on their own and gets review on them. For example Bodleian libraries which shares free digital recordings, audio tour of the library, events, exhibitions and other highlights throughout the year. University of Cape Town libraries (Screenshot 4.126) and University College London library (Screenshot 4.127) provides library services and introductory video on iTunes.

Screenshot 4.126: Use of iTunes at University of Cape Town library

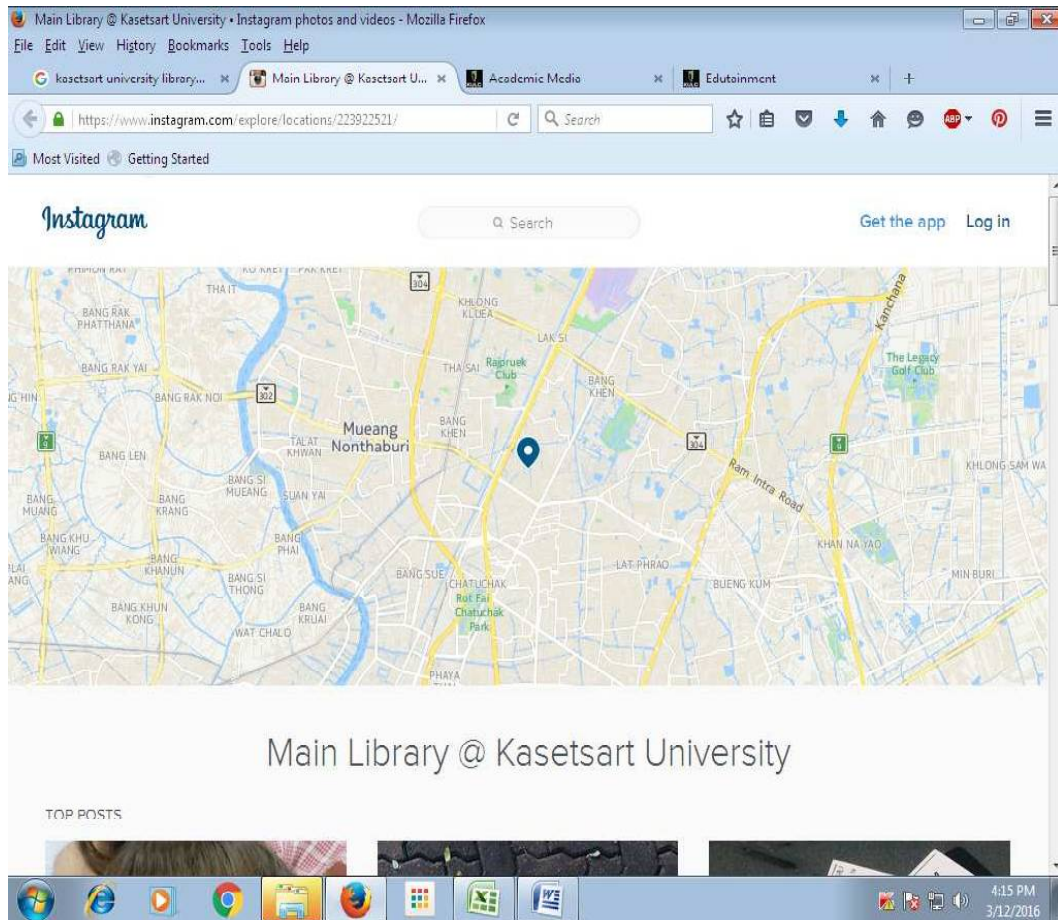


Screenshot 4.127: Use of iTunes for audio files at University College London library



4.2.3.10. Instagram: It is a simple photo application free of cost allows libraries to document and share their photos. This application launched in 2010 to make taking mobile photos in a simple, fast and beautiful way to social network (Tekulve & Kelly, 2013). University libraries use this application to showcase upcoming events, activities, success stories and outreach to patrons.

Screenshot 4.128:Kasetsart University library on Instagram

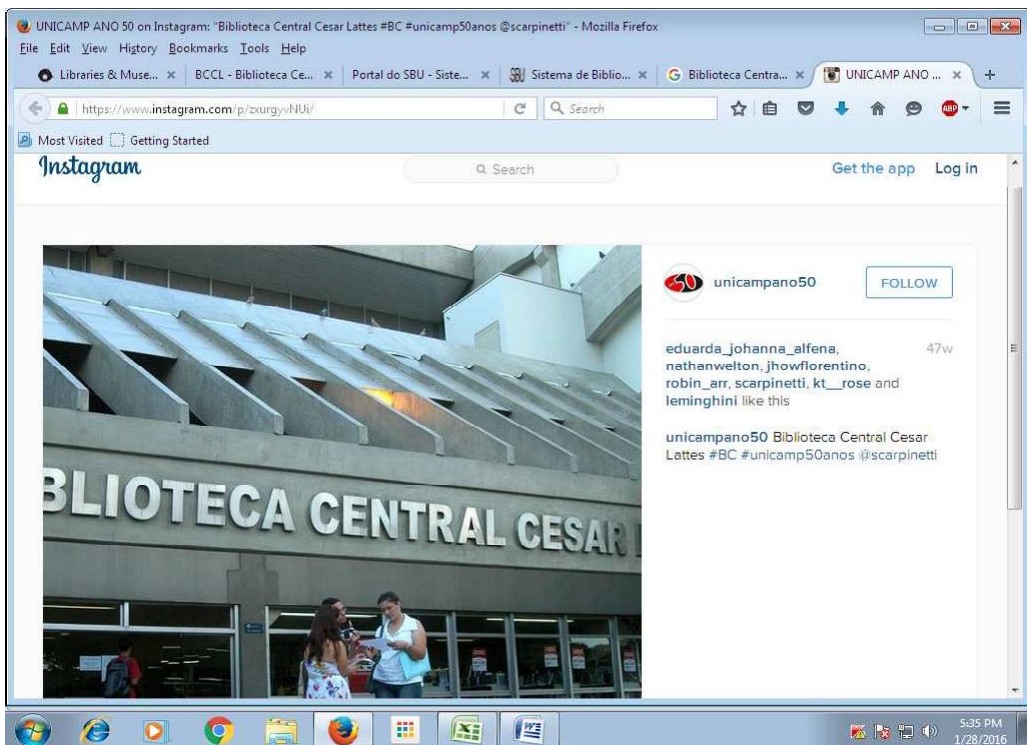


The Screenshot 4.128 shows Instagram account of Kasetsart University library and Screenshot 4.129 shows Instagram account of Melbourne University library.

Screenshot 4.129: Melbourne University library on Instagram

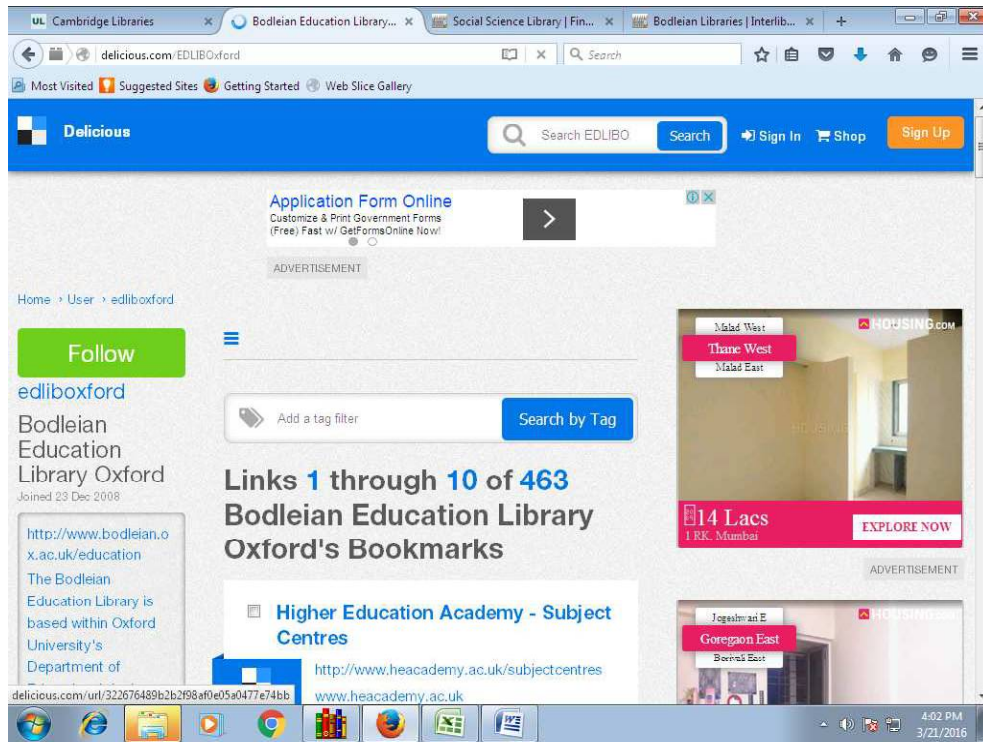


Screenshot 4.130: Central Library of Universidade Estadual de Campinas on Instagram



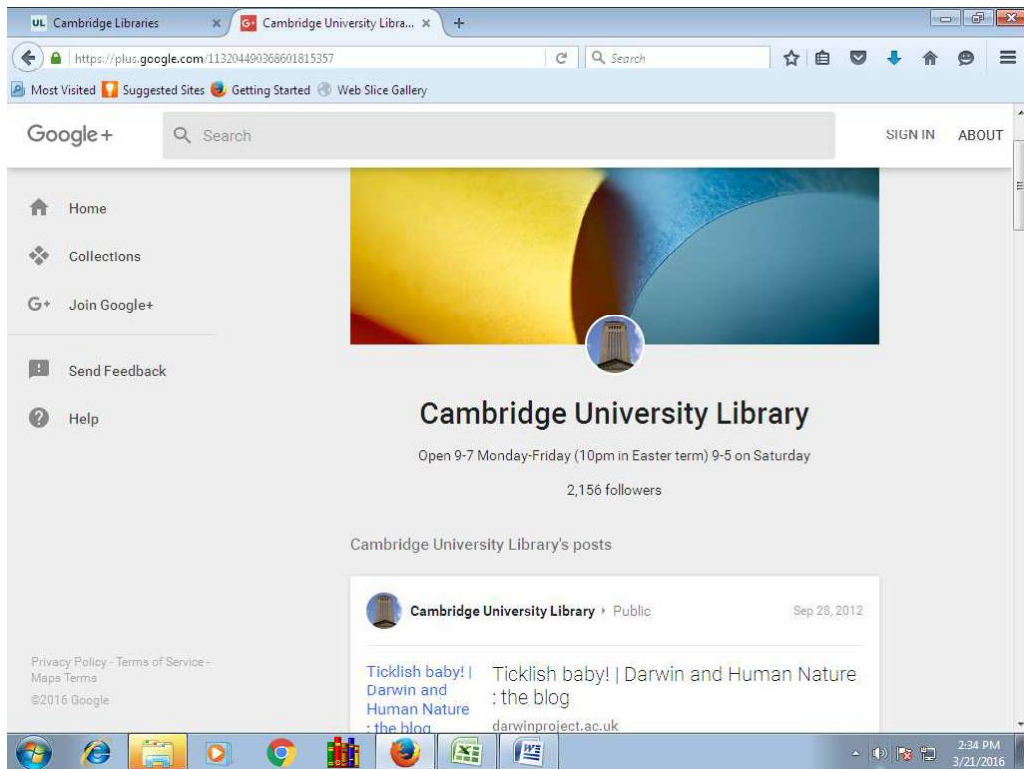
4.2.3.11. Delicious: It is widely used social bookmarking tool on the web. A university library uses this tool to identify, classify and share useful sites. Libraries can make their online resources accessible to patrons using this delicious platform. Below Screenshot 4.131 is an example of Delicious account of the Oxford University library.

Screenshot 4.131: Delicious account of the Oxford University library

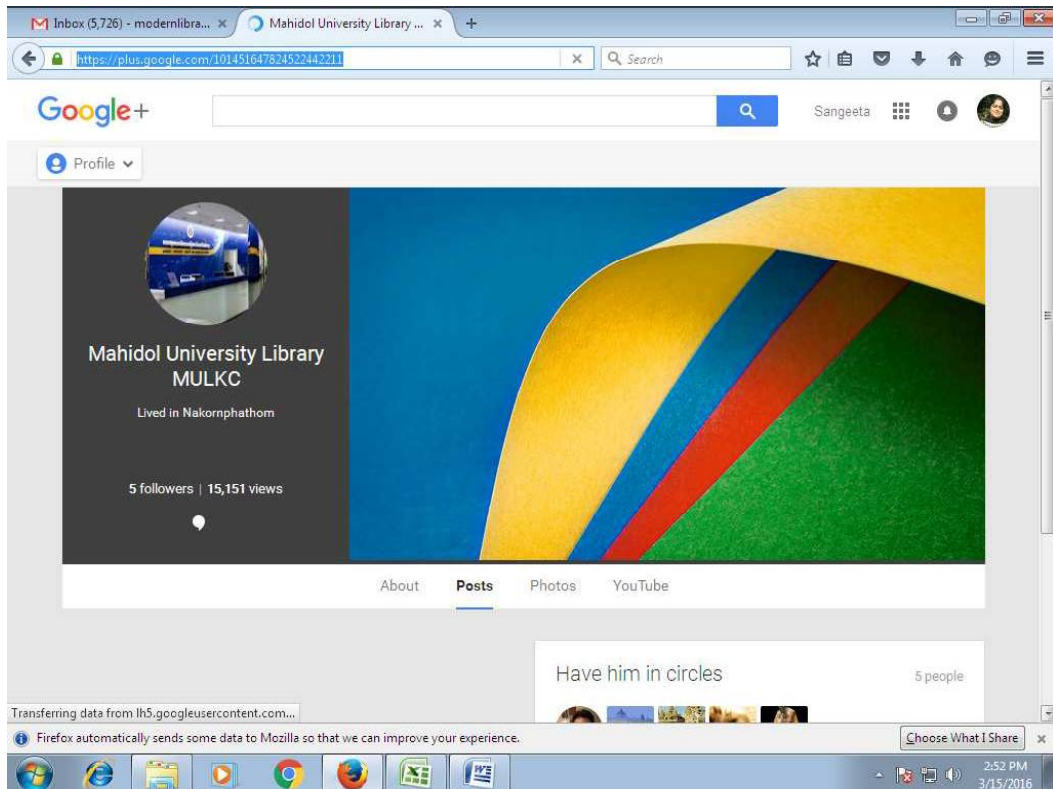


4.2.3.12. Google+: Google+ offers some interesting functionality for sharing and connecting with users and a broader community like Facebook and Twitter. Many university libraries in the world are very active and actively engaging their patrons. Libraries post interesting articles on books and technology, events and refer back to the library (Jackson).

Screenshot 4.132: Google+ account of Cambridge University library

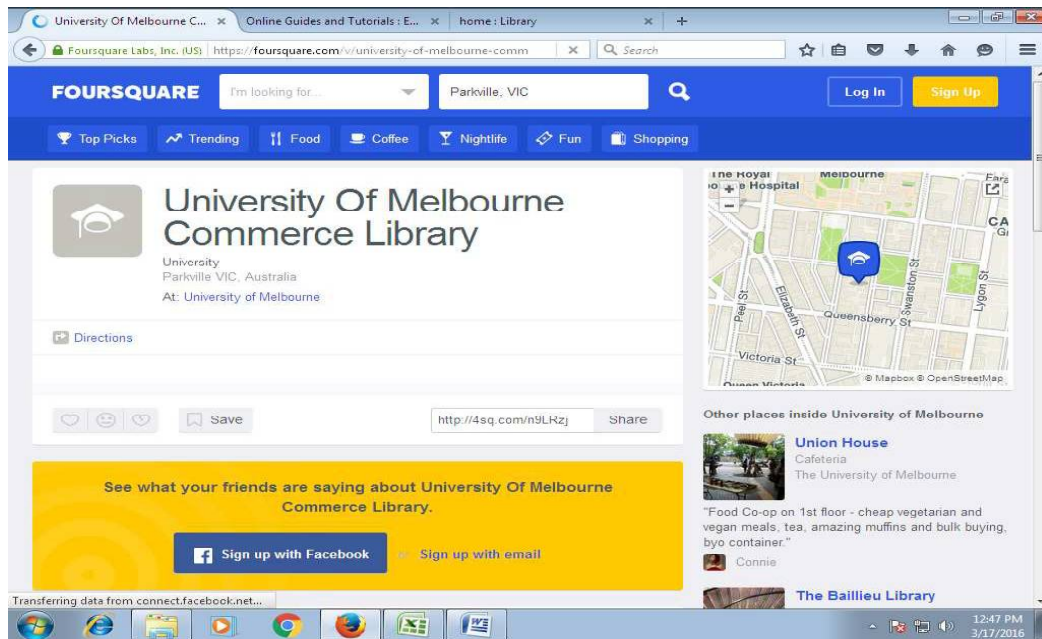


Screenshot 4.133: Google+ account of the Mahidol University library

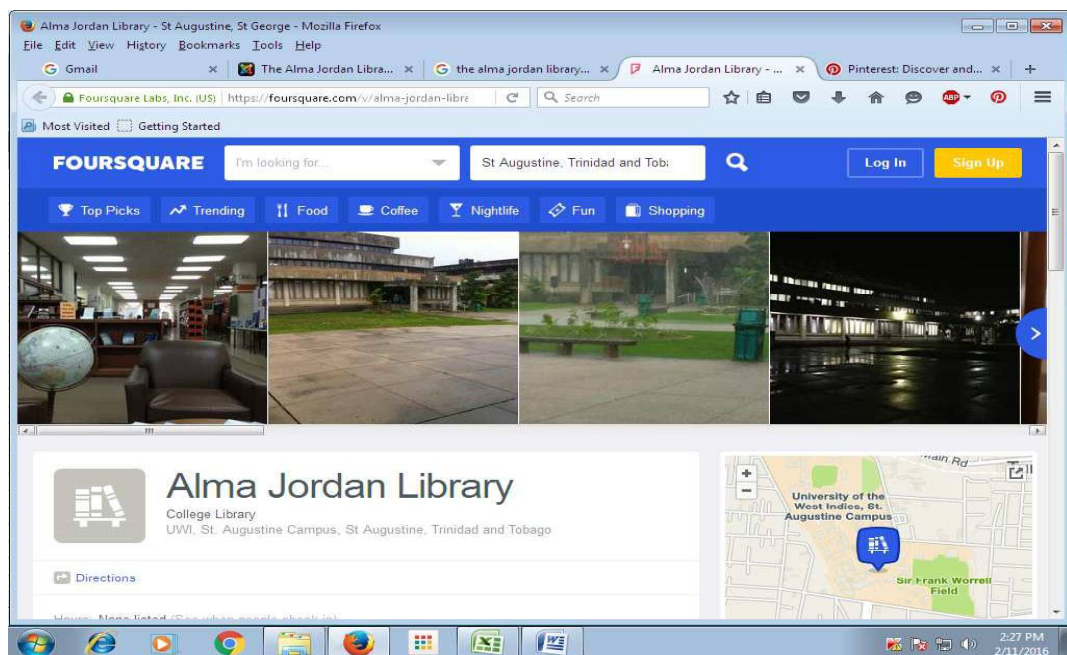


4.2.3.13. Foursquare: Foursquare is a mobile application for local search and places discovery within the city. University libraries or academic institutes are using this application to specify or highlight their location so that people will be able to locate this place. Foursquare locates university libraries with a Google map of library location.

Screenshot 4.134: Foursquare account of the University of Melbourne library

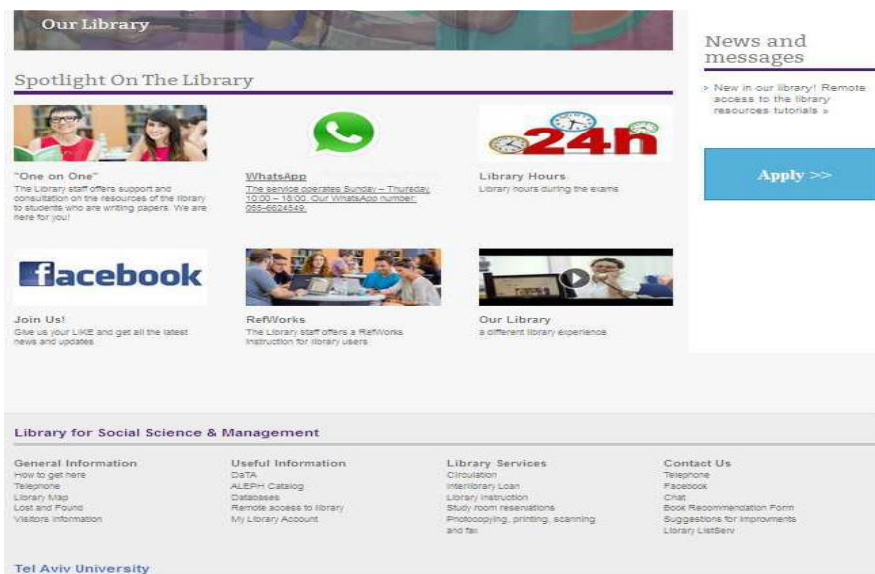


Screenshot 4.135: Foursquare account of the Alma Jordan Library of University of West Indies

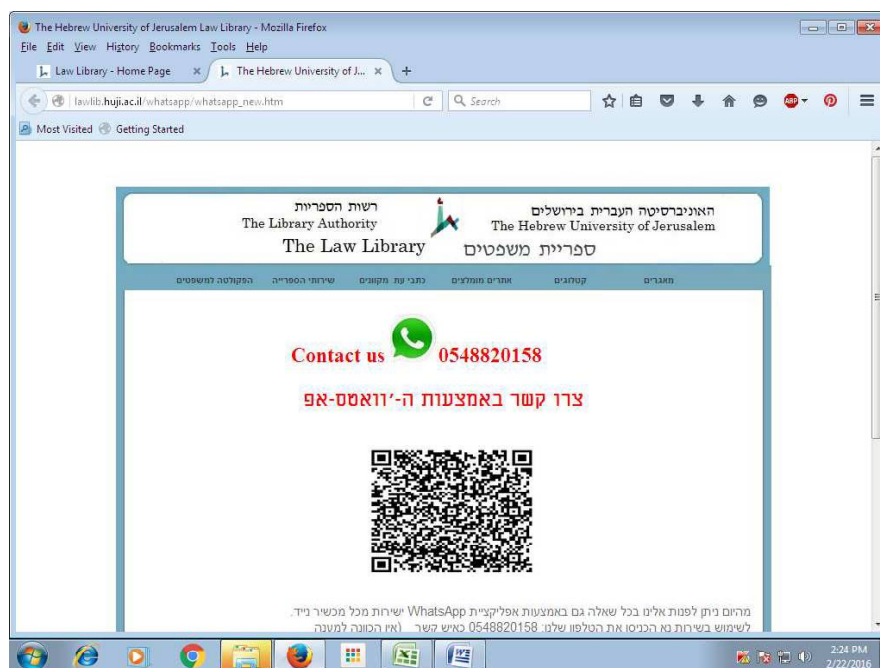


4.2.3.14. WhatsApp: WhatsApp is most popular, widely used messaging application for mobiles. Few libraries started providing mobile services through WhatsApp too. The WhatsApp contact number is given on the contact page of the library. Readers can reach them by messaging on this WhatsApp. The Tel Aviv University and Hebrew University of Jerusalem provides this service from the sample university libraries and their Screenshots 4.136 and 4.137 are given here.

Screenshot 4.136: Use of WhatsApp at Tel Aviv University library



Screenshot 4.137: Use of WhatsApp at the Hebrew University of Jerusalem

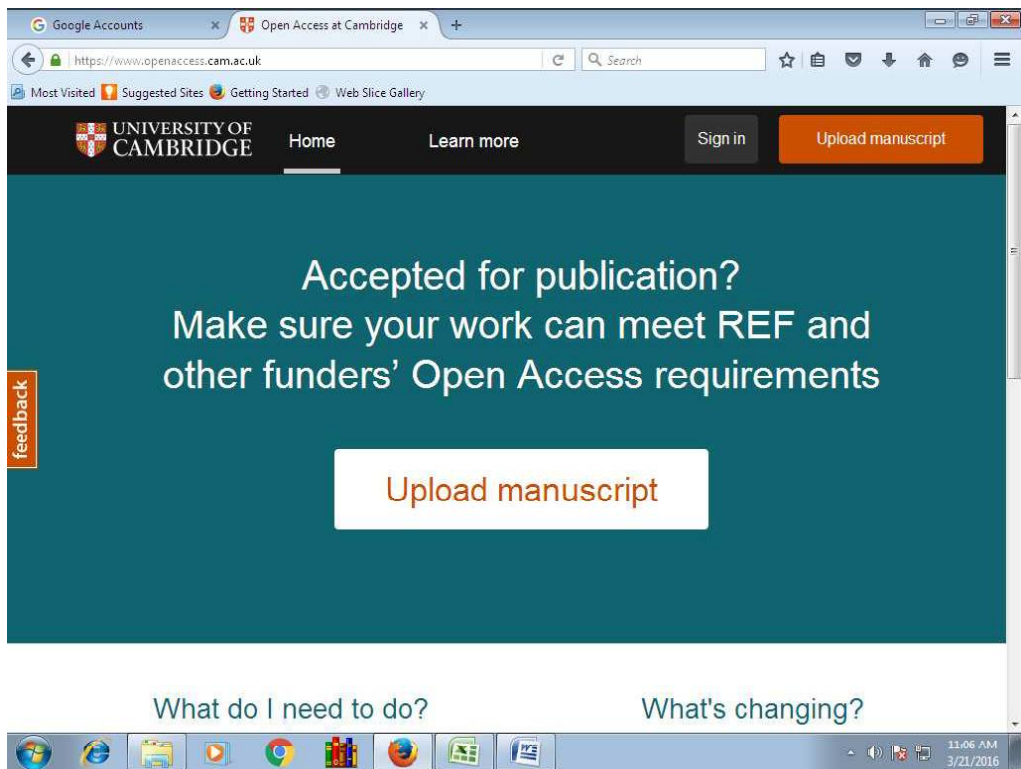


4.2.4. WEB-BASED PUBLISHING PLATFORM FOR PATRONS: The fourth cluster is related to library services for the researchers and writers in publishing their work. Time to time readers visit libraries for finding various resources related to their research area. New writers frequently ask information about where to publish, how to write and publish articles and old writers ask about impact factor journals, plagiarism check softwares, referencing and writing styles for articles, patents and citation tools, etc. This cluster has covered main important web based services universities initiated to support research writers.

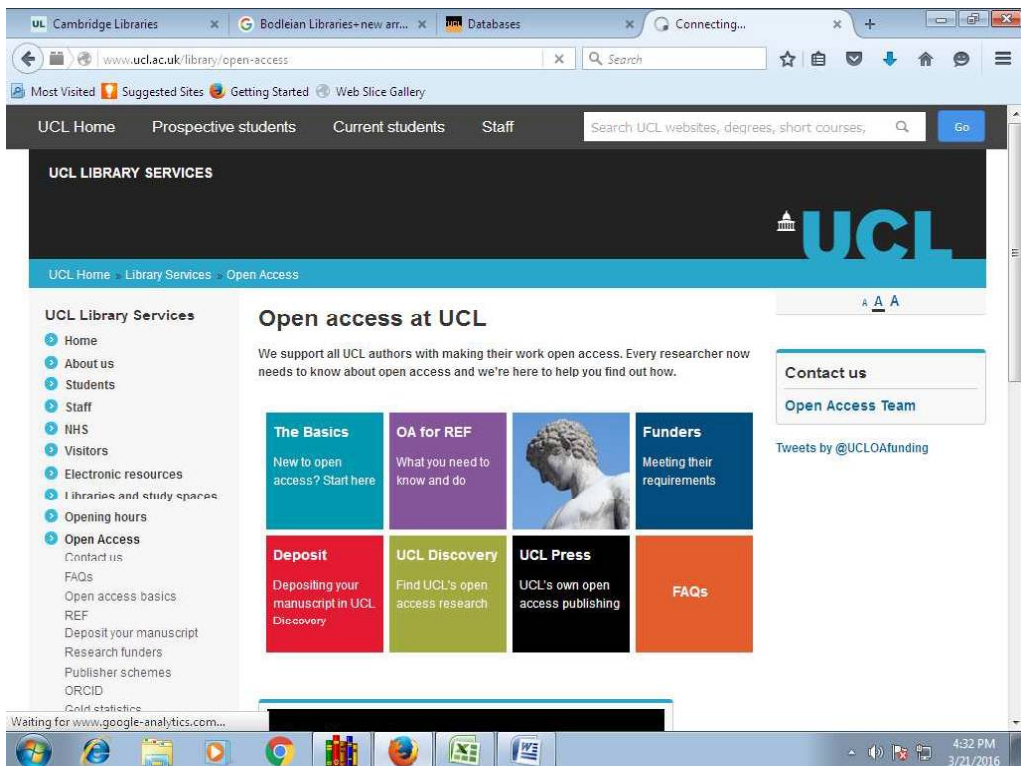
4.2.4.1. Open Access Initiatives: Open Access (OA) is free, immediate, permanent online access to the full text of research articles for anyone, web wide (Roohie, 2013). Open access helps to ensure long-term access to scholarly articles. According to 'Budapest Open Access Initiative' (BOAI) the concept of Open Access refers to "World-wide electronic distribution of the peer-reviewed journal literature, completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds." Open-access literature is digital, online, free of charge, and free of most copyright and licensing restrictions. Open access contents are not restricted only to peer-reviewed research articles, but they can be in any formats from texts and data to software, audio, video, and multi-media. (Suber, P, 2010)

In the beginning years of the 21st Century, scholarly communities got engaged with the global OA movements for opening up scholarly resources, more particularly research literature, with worldwide researchers' communities without any access fee or subscription cost (Roohie, 2013). The first Open Access repository was launched in the year 1991 named arXiv.org which helped researchers in self-archiving their preprints of scientific papers in various science and technology fields (UNESCO). In the similar way slowly all universities started practicing and using the same technology to shift from the traditional way of scholarly communication to a revolutionary way of open access by allowing researchers to upload scientific output in Institutional repository. It is an initiative towards sustainable development of institutional scholarly output. After decades also these IRs guarantee its access.

Screenshot 4.138: OAI at Cambridge University library



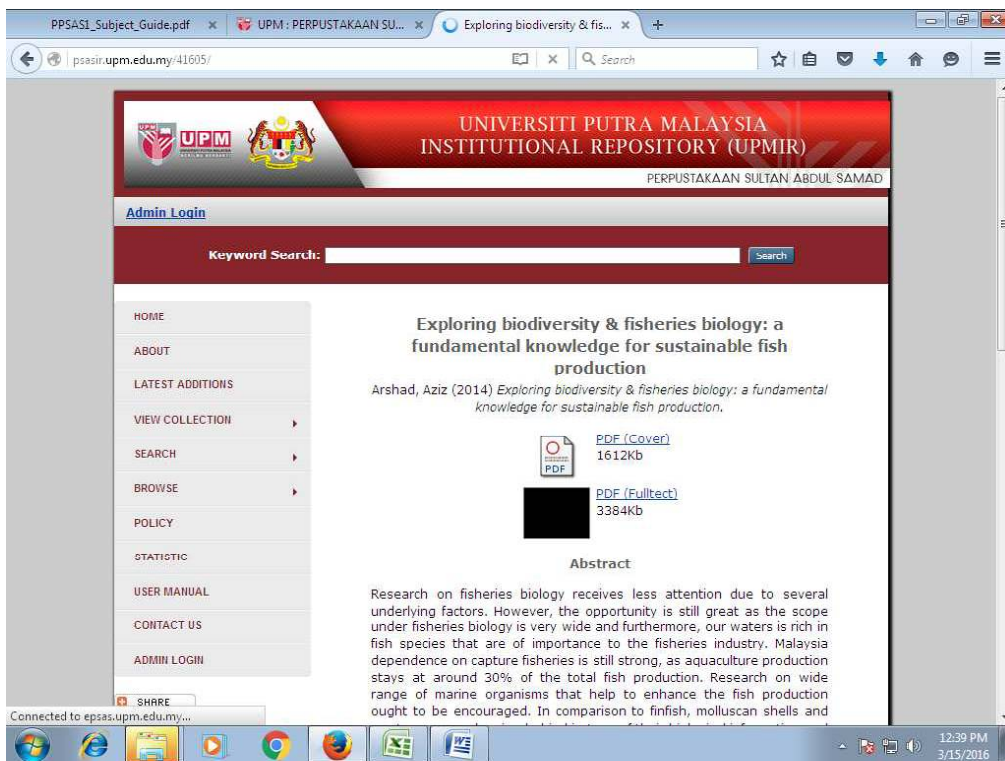
Screenshot 4.139: OAI at University College of London library



Screenshot 4.140: OAI at University of Witwatersrand library



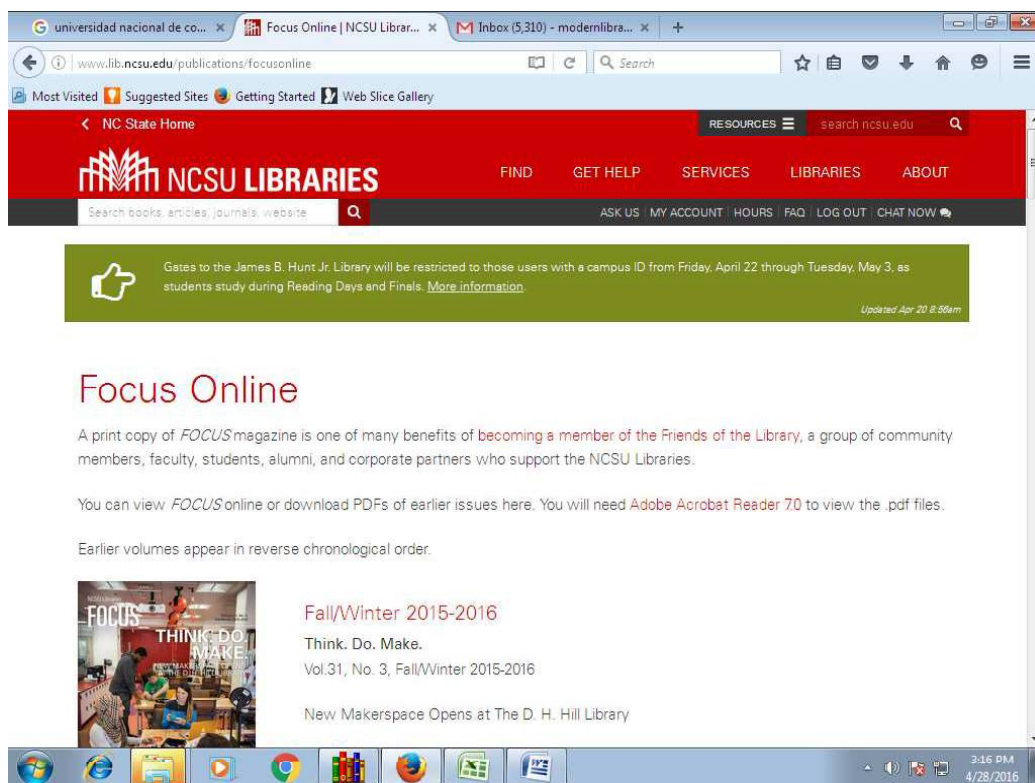
Screenshot 4.141: OAI at Universiti Putra Malaysia library



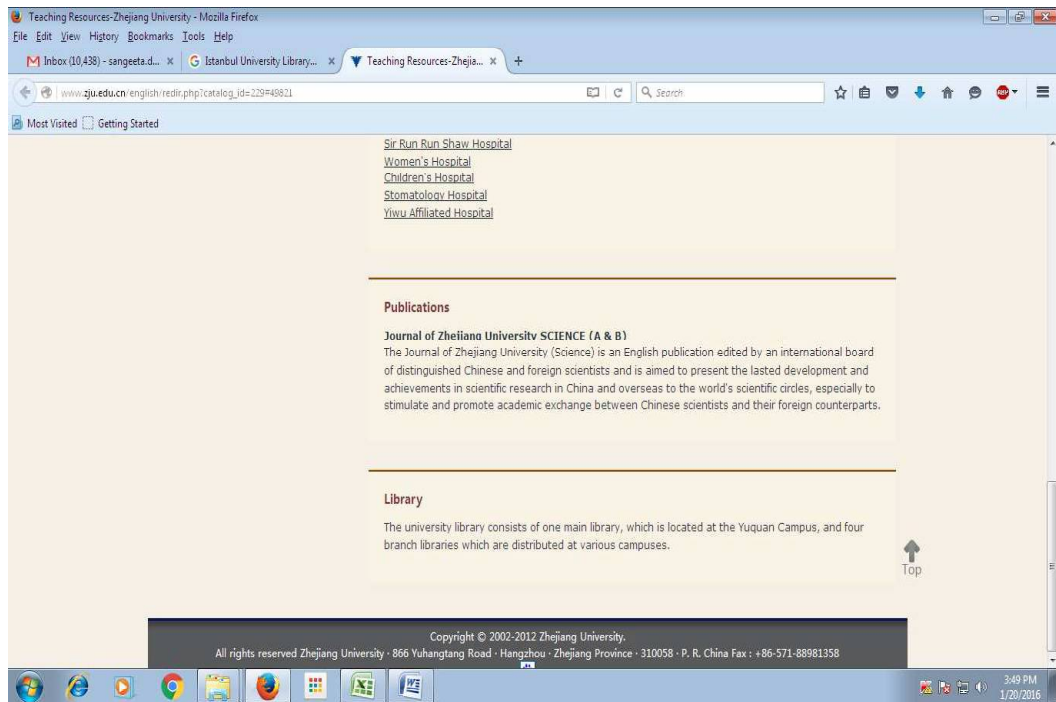
4.2.4.2. Platform for authors and journals: Researchers and patrons are publishing their research work at various level and files patents too. In institutional repository universities tries to add all the resources and even gives facility to upload work individually to enrich the IR. Libraries provide research support to all patrons starting from how to write research papers, how to select impact factor journals, citations, writing style formats, plagiarism, etc. To encourage and create writing skills among the student university libraries are playing major roles. Many libraries offer a platform like online newsletter, book review section, journals, magazines, bulletins, in which they invite articles from the patrons/ researchers/readers.

Below are screen shots of few examples of such platforms offered by sample university libraries.

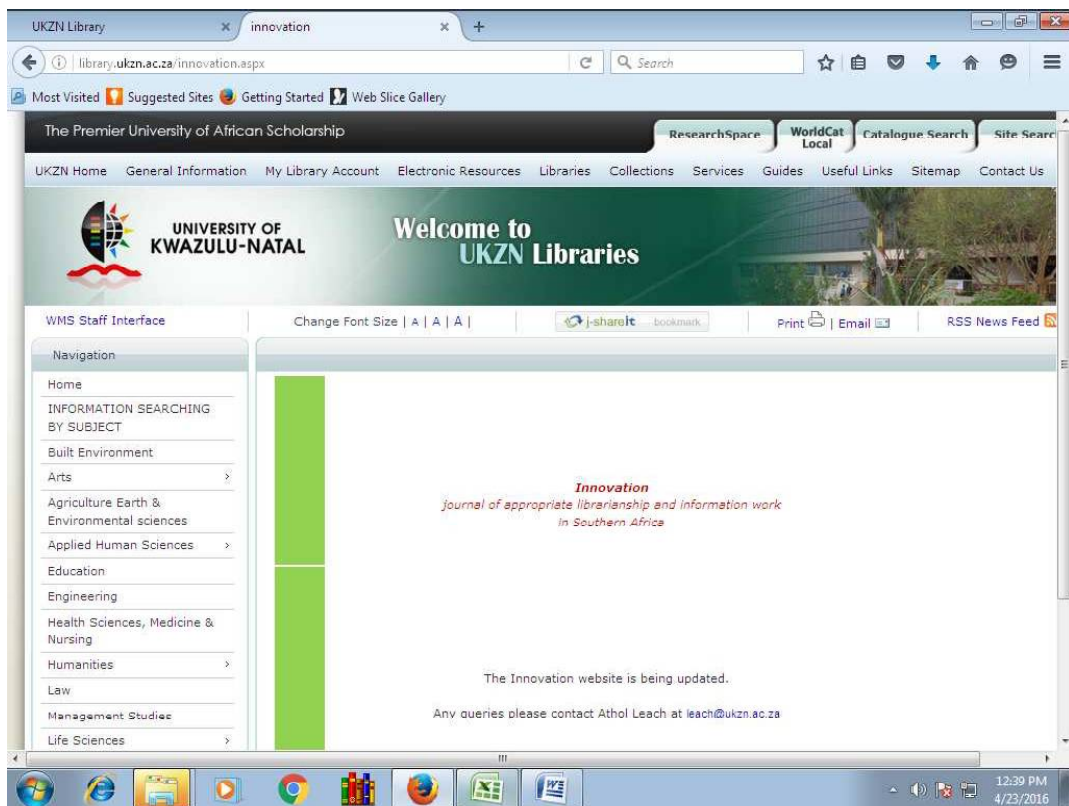
Screenshot 4.142: NCSU publishes an online magazine Focus for patrons



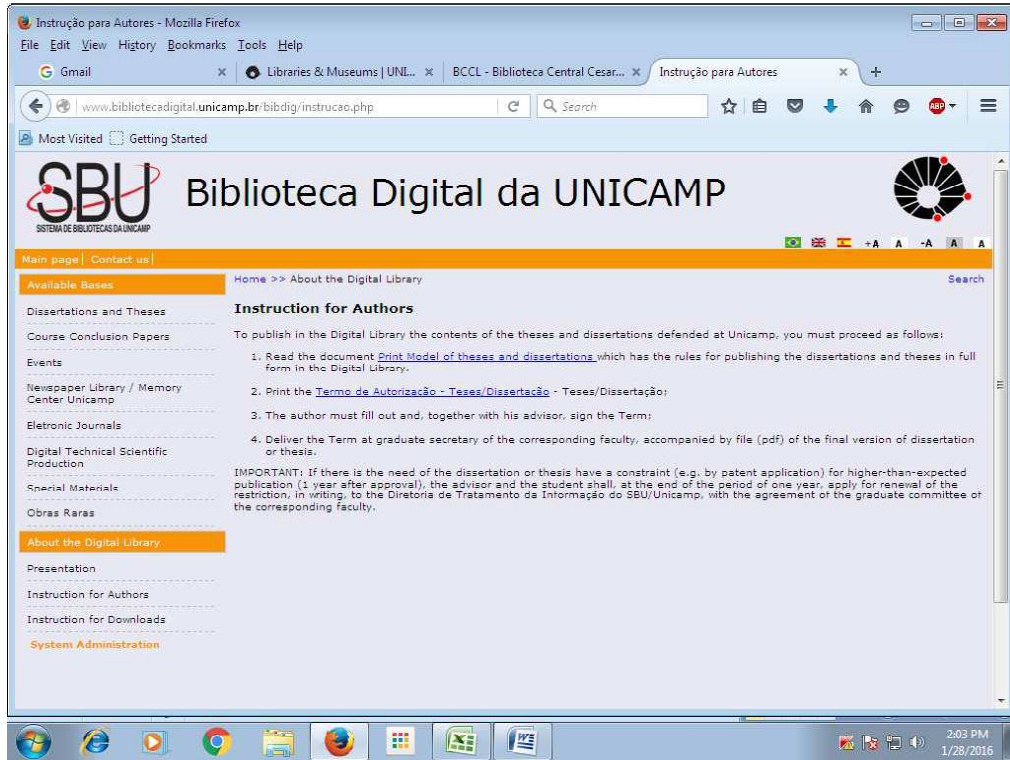
Screenshot 4.143: Zhejiang University library publishes journal of Science



Screenshot 4.144: University of Kwazulu Natal library publishes journal Innovation



Screenshot 4.145: Universidade Estadual de Campinas library provides platform to publish thesis and dissertations



Screenshot 4.146: University of Putra Malaysia publishes journal *Pertanika*

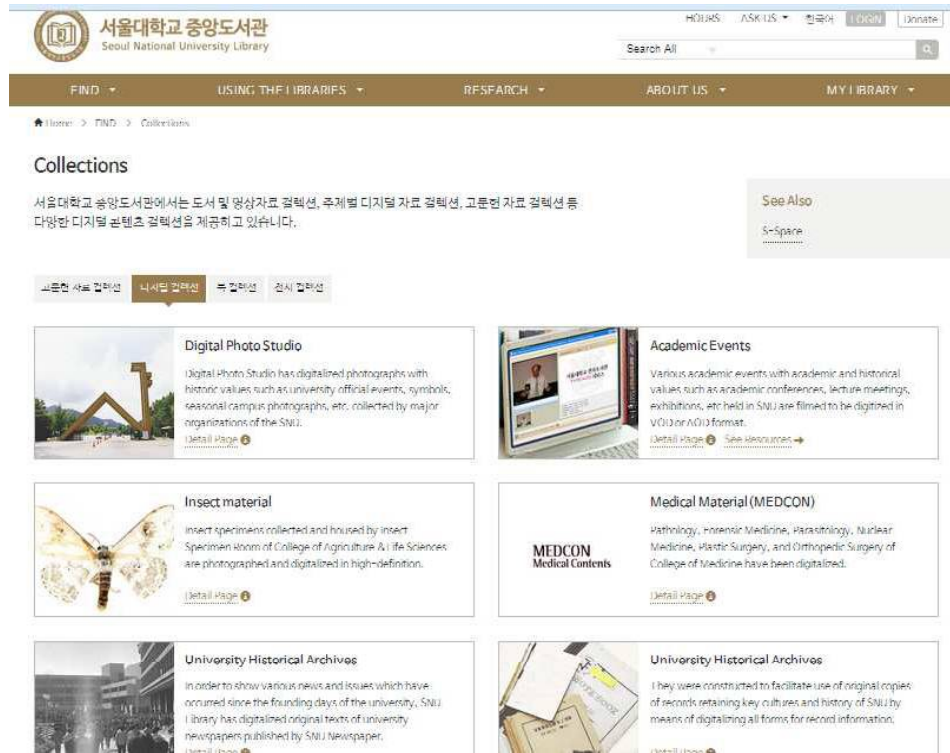


4.2.4.3. University Records Management: Many university libraries are managing university records and have a separate digitization unit where they scan all important university documents and preserves as archives. Records are one of the University's most valuable assets. Records support decision-making, demonstrate compliance and document the history of the University (Harvard Library). University records are vital University assets requires careful management. Creating and managing records contribute to greater business efficiency, promotes compliance, protects the University from legal risk, and preserves its history. University records include all forms of recorded information, regardless of physical characteristics or a format that are created, received, recorded, or legally filed in the course of University business (Harvard University).

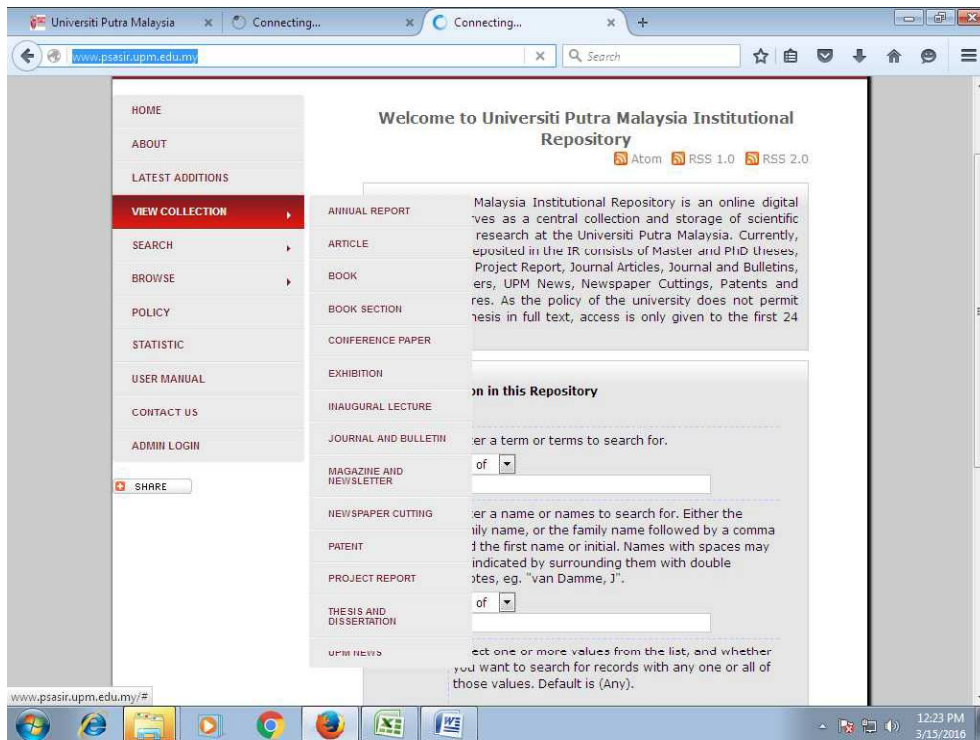
University records have historical value and therefore they are transferred to university archives to preserve them for longer time. Their records can be annual reports, event photos, guest speeches, videos of important programs, university projects, test community, maps, projects, lectures, audio, video files, interviews, newsletters, administrative documents, historical documents, datasets, and course notes, learning objects, conference proceedings or other special and rare collection. Management and maintenance of university records are part of Institutional repository. Access to some important documents is restricted.

Few screen shots of selected Institutional Repositories of university records are given here.

Screenshot 4.147: Seoul National University collection maintained by the library



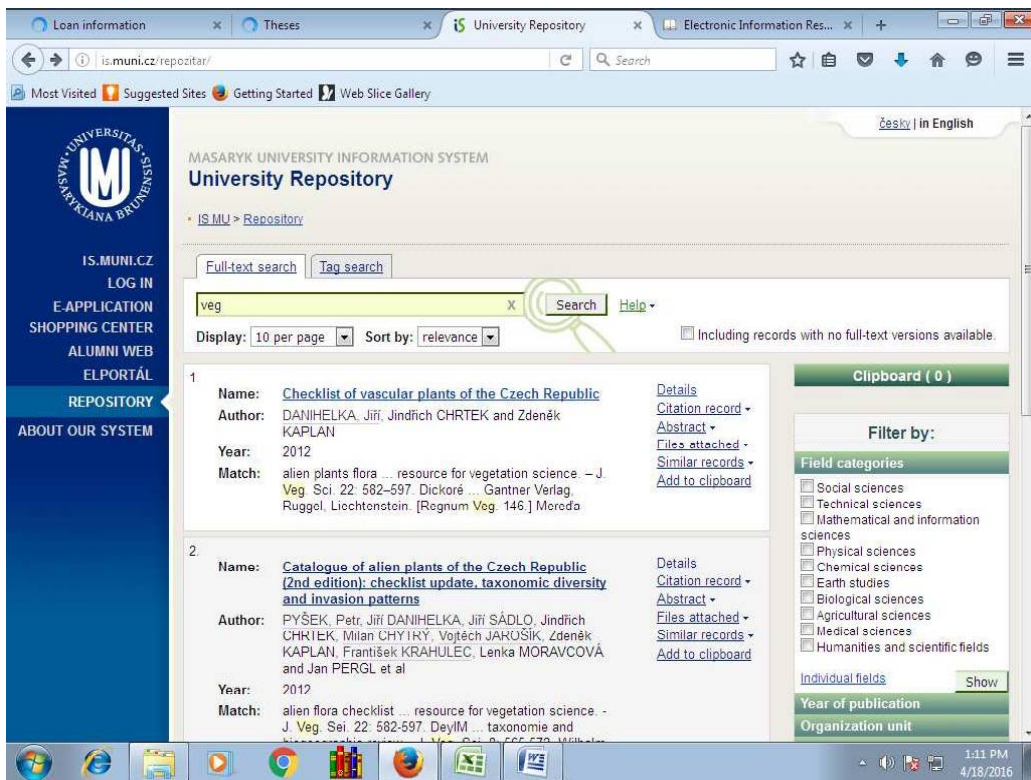
Screenshot 4.148: IR of Universiti Putra Malaysia



Screenshot 4.149: NCSU Digital repository managed by the library



Screenshot 4.150: Repository of Masaryk University

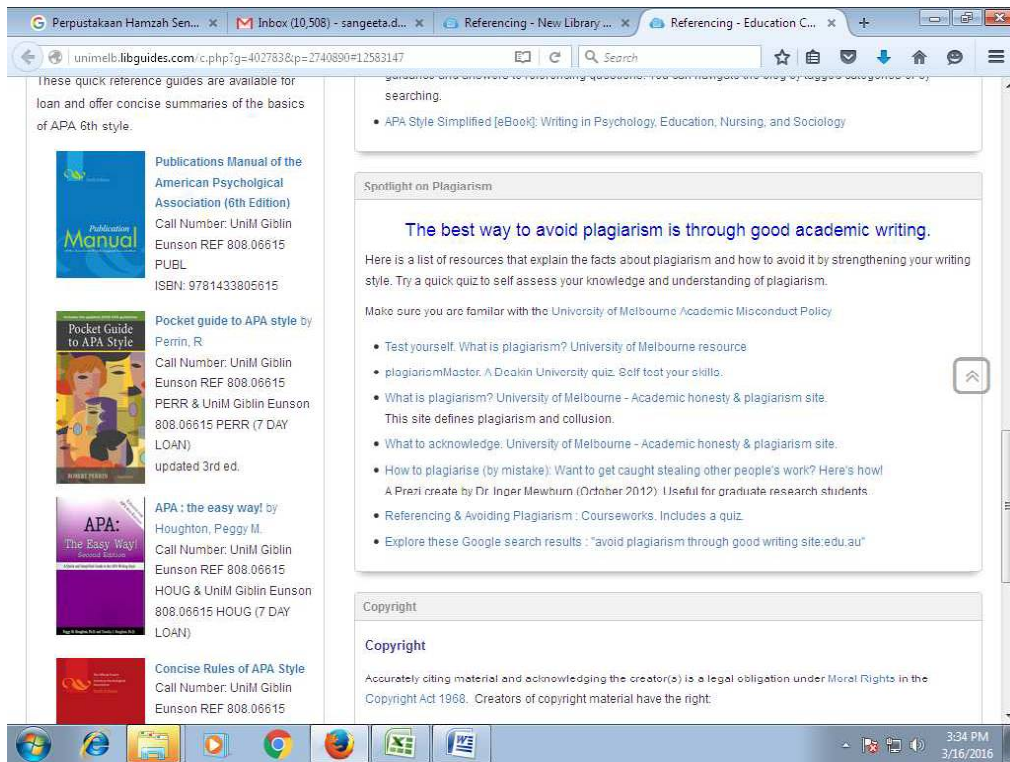


4.2.4.4. Anti-plagiarism Software Access/ Help: Because of ICT, information explosion, mobile technology, web technologies and open access initiative in academic and research community plagiarism (cutting and pasting a work of unreferenced texts) has become new problem. Many students found plagiarizing in their assessment, projects, publication and even thesis. It is an intentional or unintentional attempt, but it is becoming a serious issue in academic institutions as it is an offense. It can destroy the reputation and profession of students as well as institutes and therefore universities are under pressure to tackle this problem. To solve this problem universities understood that just monitoring, policing the plagiarism is not enough, but to educate students and teacher to use technology, e.g. softwares like Turnitin, iThenticate software to avoid plagiarism and also teach them academic referencing norms e.g. EndNote reference manager software. Researchers and students get benefited if all this important information and software made available online. Many top University libraries are providing all this information related to plagiarism to their patrons on the website. They provide video tutorials, text instructions, demonstrations, guides to educate patron.

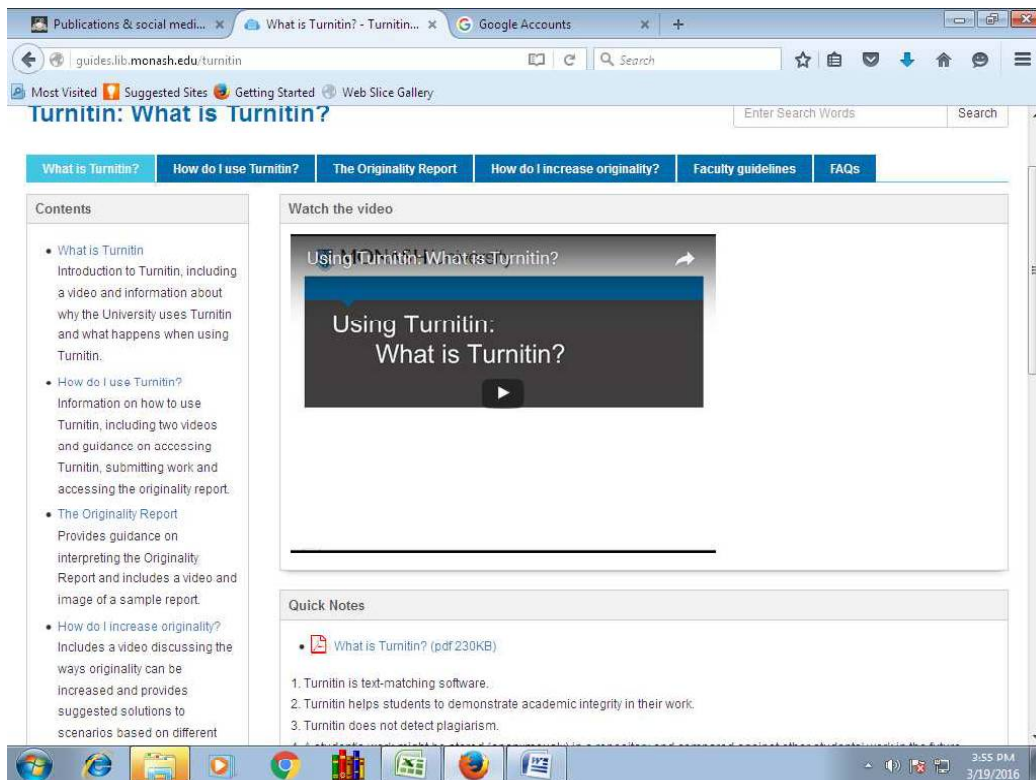
Screenshot 4.151: Plagiarism prevention help at University of Pretoria library

The screenshot displays the University of Pretoria library's plagiarism prevention page. At the top, there is a navigation menu with links like 'Library Home', 'About the Library', and 'Catalogue'. A search bar is located on the right side. The main content area features a central diagram with two overlapping circles: a blue circle on the left labeled 'Moral' and a red circle on the right labeled 'Legal'. The intersection of the two circles is shaded purple and labeled 'Both: When you take it without permission and pass it off as your work'. Above the 'Moral' circle is the text 'Plagiarism: When you don't say where you took it from'. Above the 'Legal' circle is the text 'Copyright Infringement: When you take it without permission'. To the left of the diagram, there is a list of resources including 'Turnitin factsheet for students', 'Plagiat verklaring', and 'Plagiarism Prevention Policy'. To the right, there is a 'Quick Links' section with links to 'Teaching Support', 'Research Support', and 'Copyright'. The bottom of the page shows a Windows taskbar with the system clock at 12:36 PM on 7/7/2016.

Screenshot 4.152: Plagiarism prevention help at University of Melbourne



Screenshot 4.153: Access to Turnitin at Monash University library



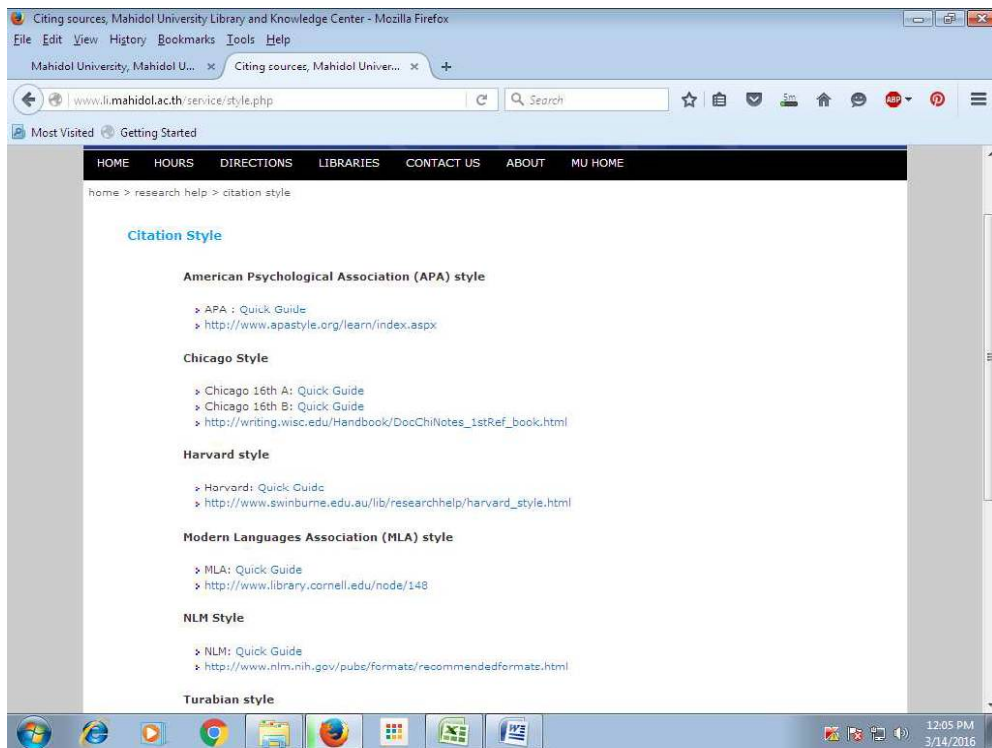
Screenshot 4.154: Access to Turnitin and help at American University of Beirut



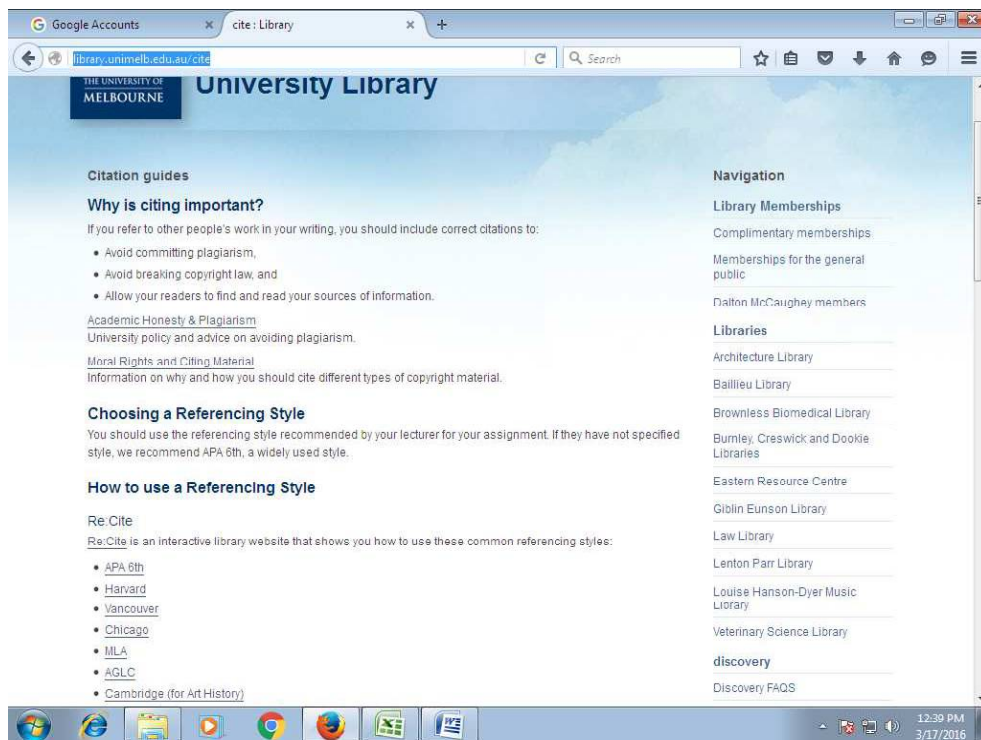
4.2.4.5. Citation Tools/Help: Patrons doing research always need the help of the library when they cite any work in their publications. Different journals need papers in different formats of citations and referencing style. To avoid plagiarism author needs to give due credit to the original author by citing his work. To promote the research environment, giving information related to writing quality papers in proper format and without plagiarism, university libraries are taking more efforts to train users by providing them information about citation tools.

Following are few examples of the top universities offering citations related service.

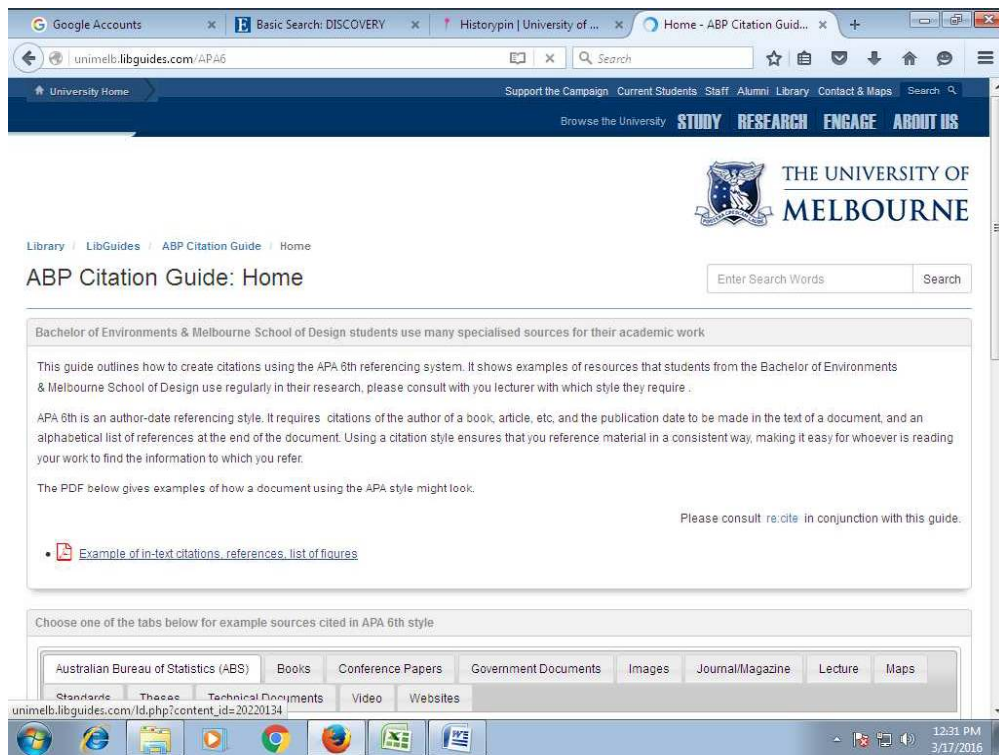
Screenshot 4.155: Citation help at the Mahidol University library



Screenshot 4.156: Citation help at the Melbourne University library

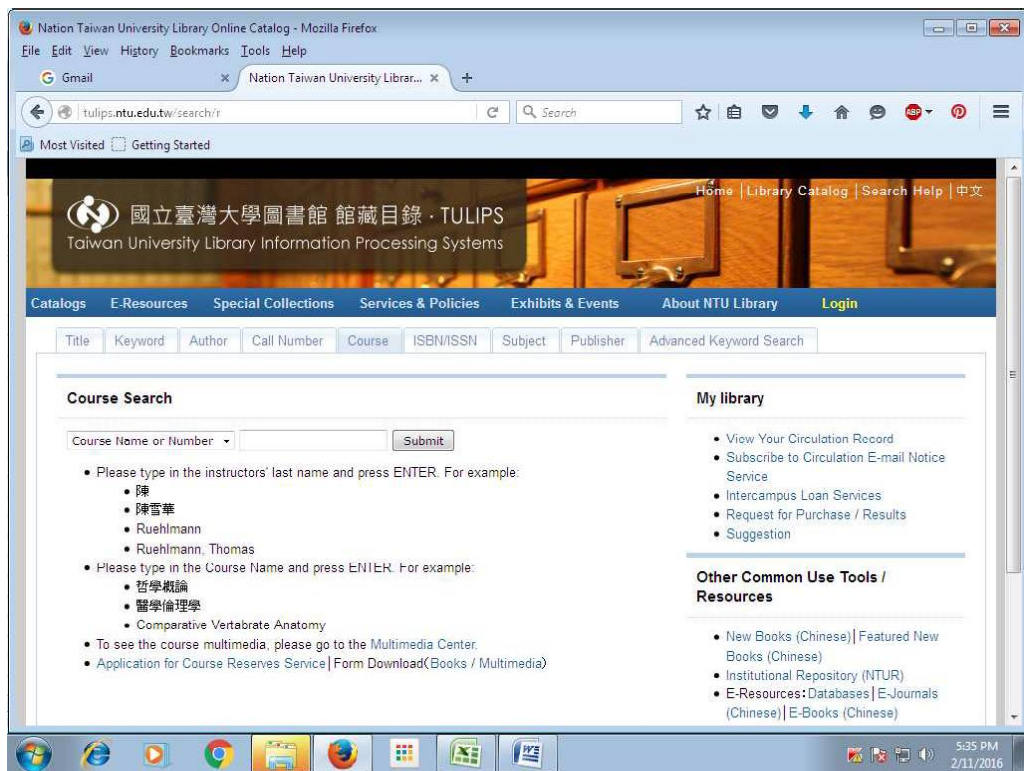


Screenshot 4.157: Citations guide at the University of Melbourne

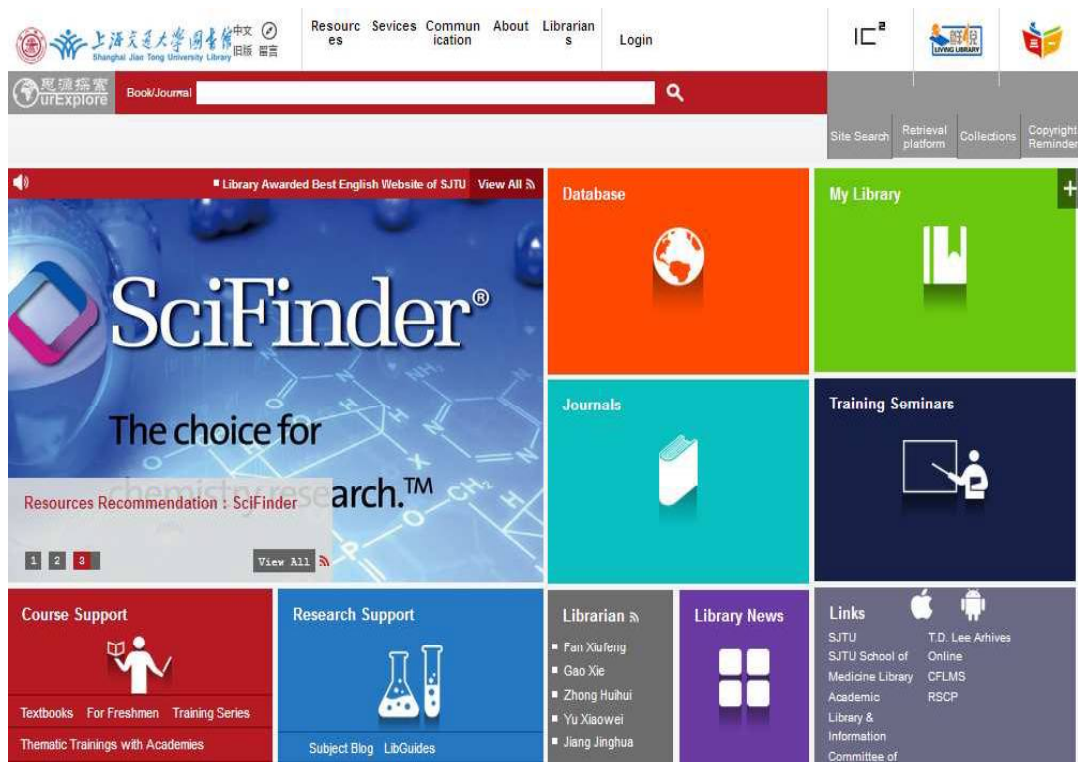


4.2.4.6. Coursework: Libraries play an important role in all coursed conducted by the University. Universities are conducting many online courses and providing reading material online. Libraries started working with the teachers and tutors to provide course related reading material. Few University libraries providing coursework help including reading materials and tools are the Taiwan University Library provides a course search facility through the Taiwan University library information processing system (TULIPS). Another example is of the Shanghai Jiao Tong University providing course support to students.

Screenshot 4.158: Course work/ reserve service at Taiwan University library



Screenshot 4.159: Course support at Shanghai Jiao Tong University library

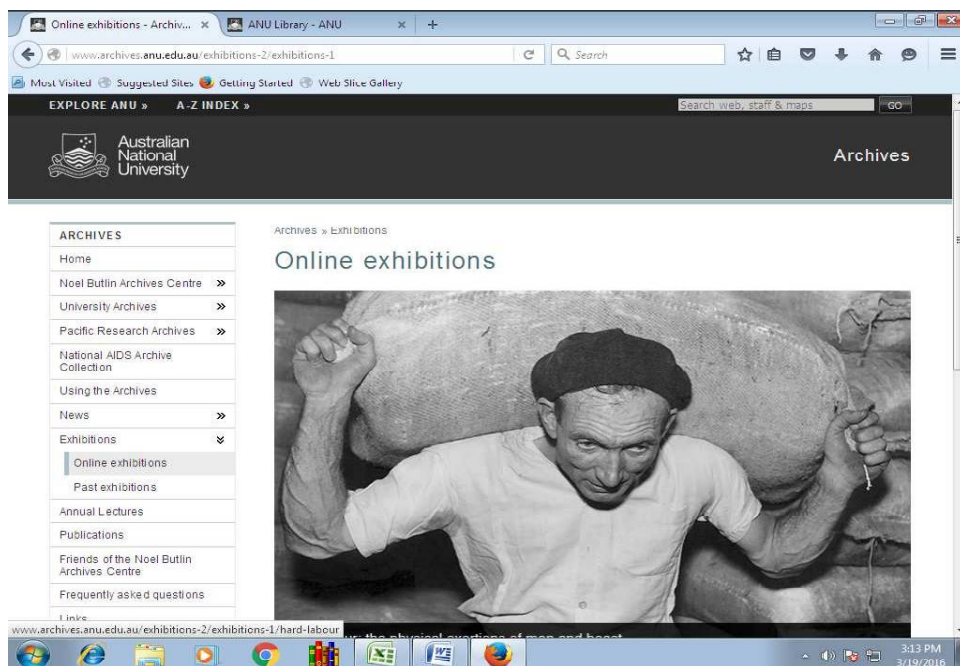


4.3. PART B: WEB-BASED BEST PRACTICES OFFERED BY UNIVERSITY LIBRARIES:

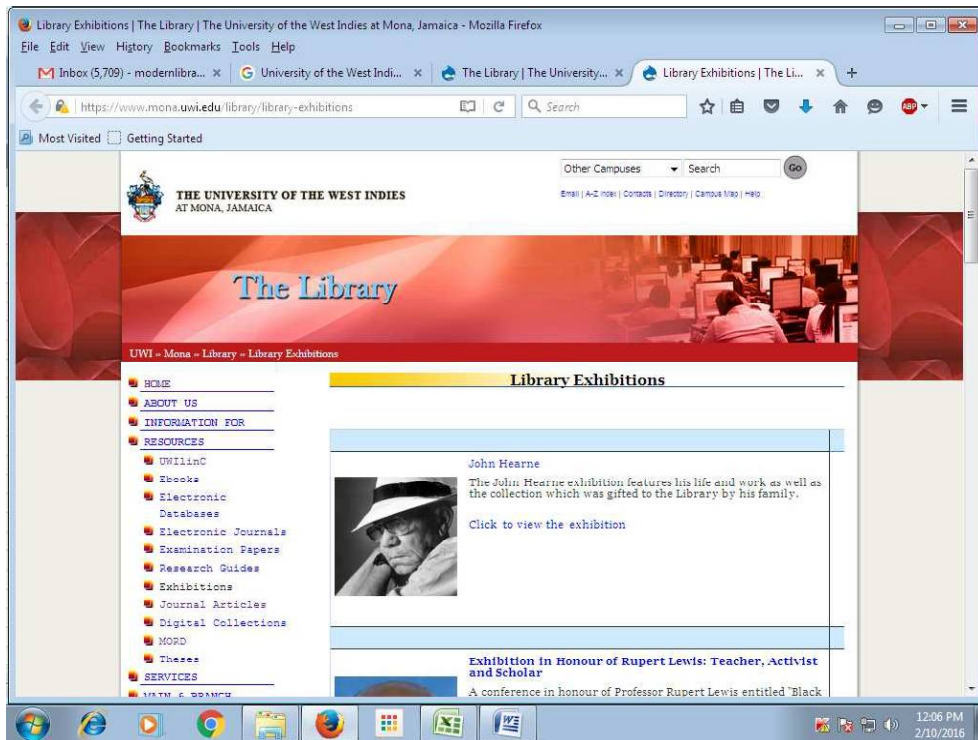
In this cluster principal investigator listed the best practices few top university libraries are following while providing web based services apart from the services mentioned in first three clusters. Best practice requires active participation, willingness, creativity and problem solving attitude from all library stakeholders. On the basis of feedback for overall performance improvement university libraries takes continuous efforts. A best practice may be innovative and be a philosophy, policy, strategy, program, process or practice that solves a problem or create new opportunities and positively impact the whole organization (NAAC, 2006)

4.3.1. Online Exhibitions: University libraries conduct exhibition of books and other reading materials, museum, archives in their libraries frequently. Notifications circulated among the students about time and place of exhibitions. Few top university libraries like the Australian National University, the University of West Indies, the Jagiellonian University Library, the Alma Jordan Library, the AUB University libraries organize and display online exhibitions of their archives, Bibliographies, special collection and life and work of eminent personality(American university of Beirut libraries). Many exhibitions are named by renowned eminent personalities and founders of those universities.

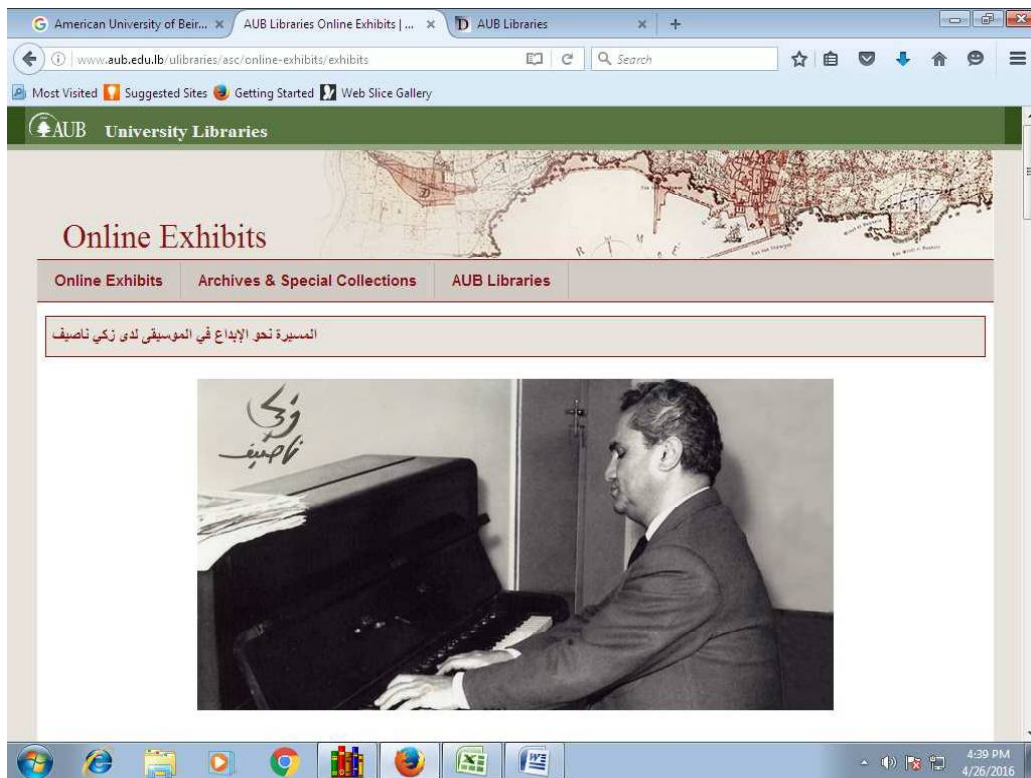
Screenshot 4.160: Online exhibitions at the Australian National University library



Screenshot 4.161: Online exhibitions at the University of the West Indies library

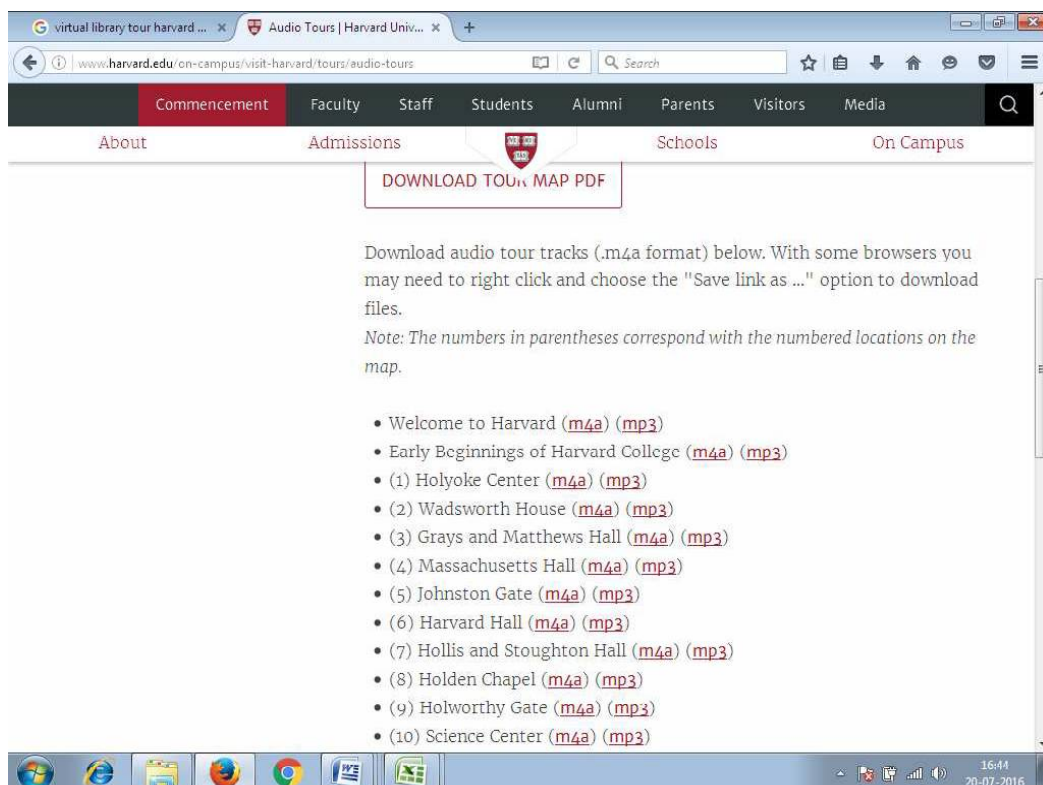


Screenshot 4.162: Online exhibitions at American University of Beirut library



4.3.2. Virtual LibraryTour: University libraries are always open to university stakeholders, but restricted to public. The virtual tour is nothing but self guided tour with an interactive pathway and library map that highlights importance of that location/section or services. It can be a beautifully shoot video of the library sections with its brief information and an overview, self guided audio form or mobile application form in which, when you approach with your smart phones to library building or section these tour guide provides important information about Harvard programs you will be able to hear the information about that section or point or map or floor plans or maps in pdf file. These online tours gives features of each location to find your way and library policies and specialized collection in the library and takes you to its appearance from inside, different sections, facilities and history of that library to public and non members. Harvard University Library gives self guided tours in audio form, map pdf form and mobile tour as university campuses and library has a rich history. While Cambridge, Peking, Columbia and Mahidol University libraries provide virtual tour in video form.

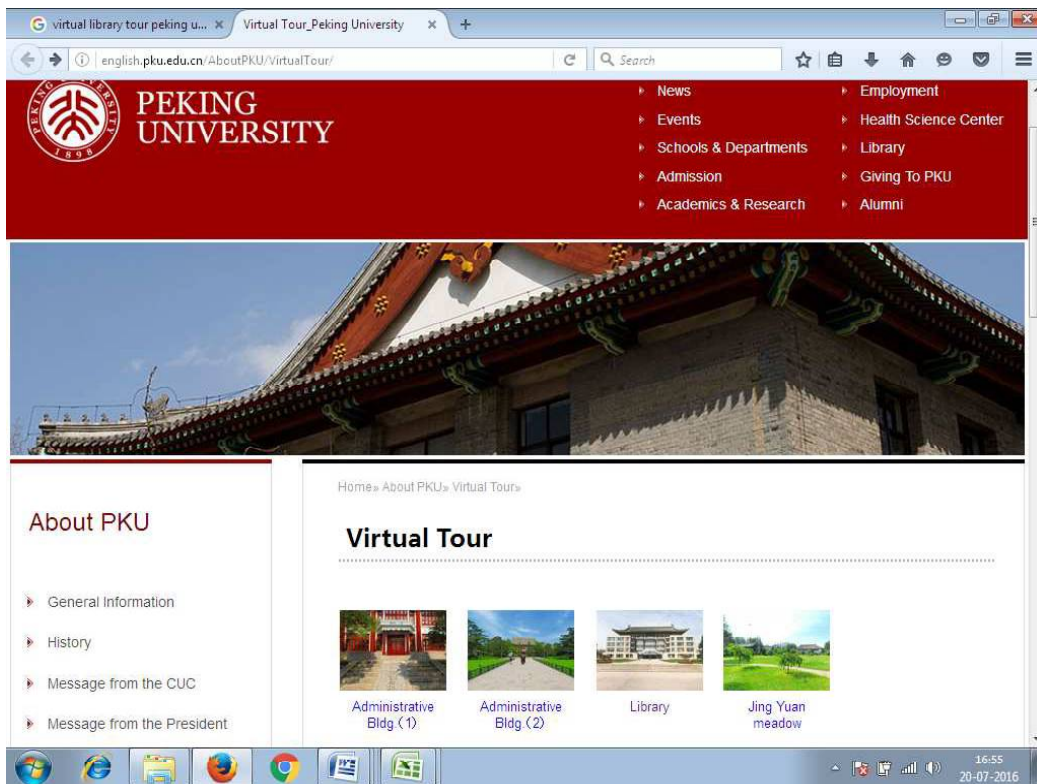
Screenshot 4.163: Virtual (Audio-visual) tour of Harvard University library



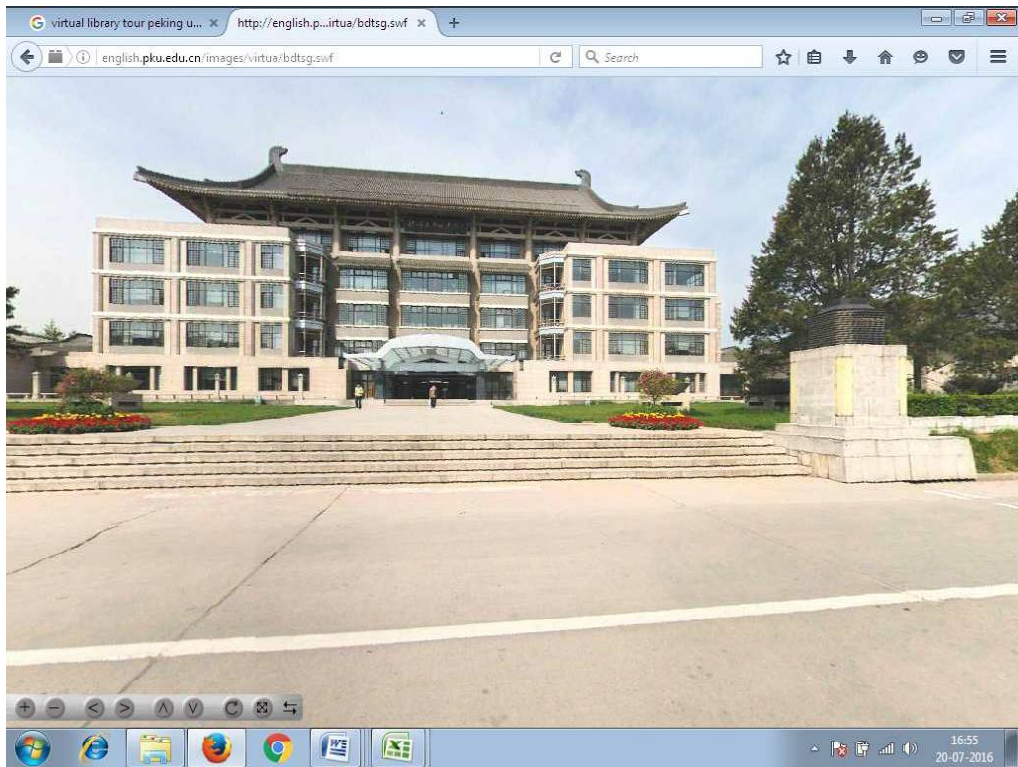
Screenshot 4.164: Virtual tour of Columbian university library



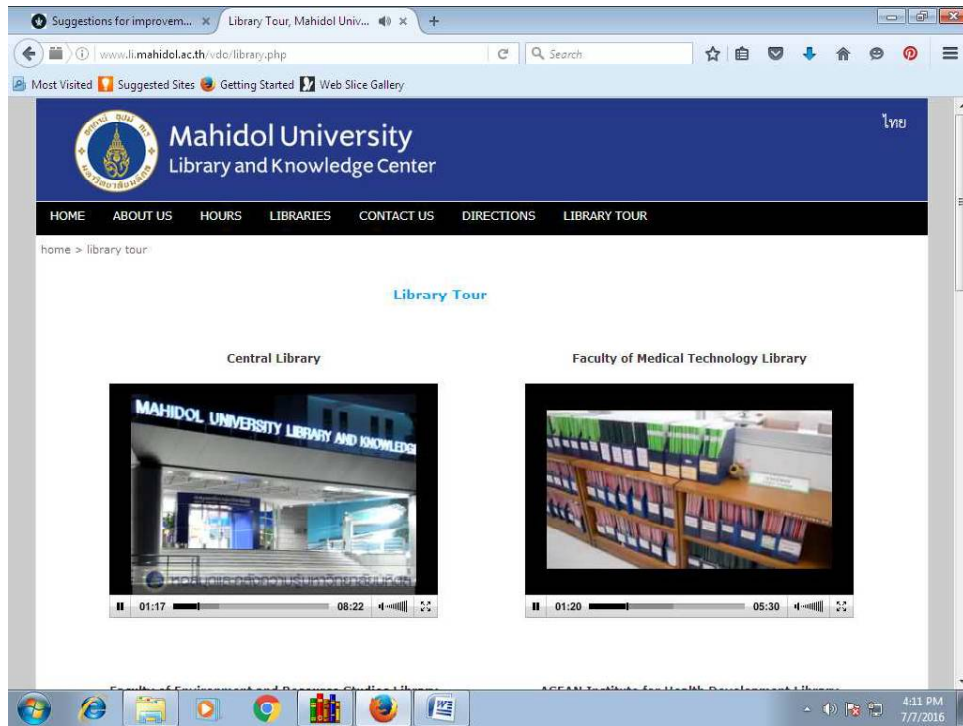
Screenshot 4.165: Virtual tour of Peking University library



Screenshot 4.166: Virtual tour of Peking University library



Screenshot 4.167: Virtual tour of Mahidol University library

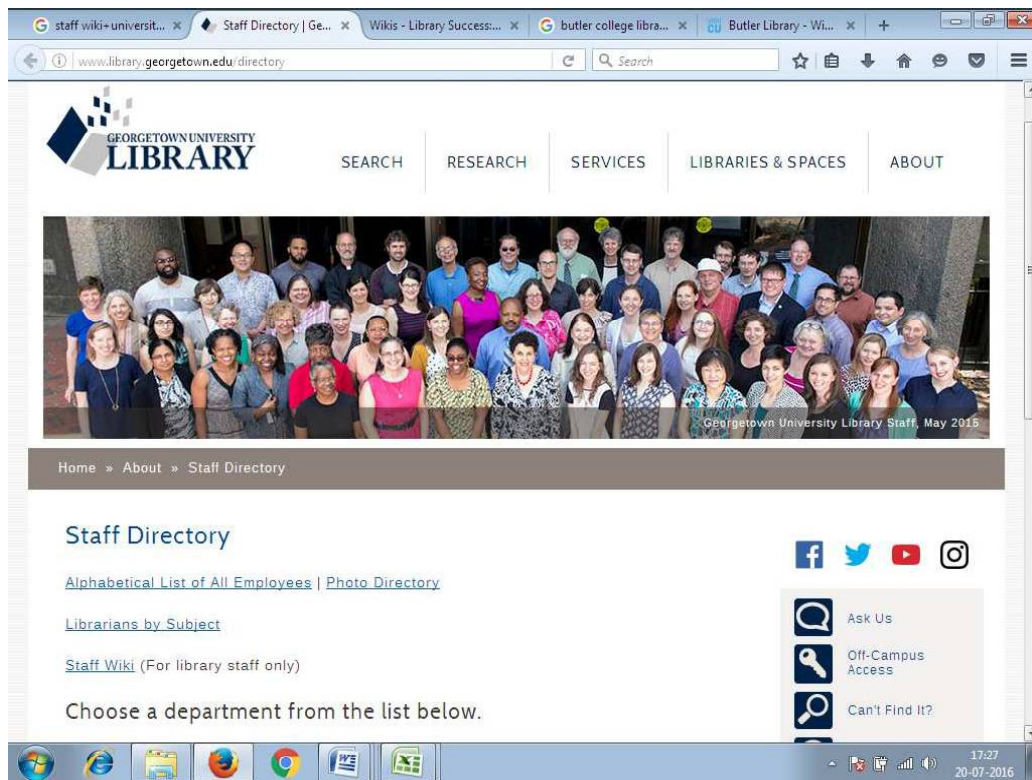


Screenshot 4.168: Virtual library tour of King Abdul Aziz University library



4.3.3. Wikis: Since 2001 Wikis facilitate collaborative authoring. In library, wikis are used for various purposes like collaboration among libraries, library staff and patrons, sharing information, collecting software documentation, supporting conferences, facilitating librarians to faculty collaboration, creating digital repositories, managing web contents, creating intranets, providing reference desk, creating a knowledge base, subject guides and collecting readers reviews. At large level wikis were used to support collaboration among library staff intra-organizational and extra-organizationally (Bejune, 2007). Many university libraries created their wikis for giving overview of library and its services. Below are few examples of top University library wikis.

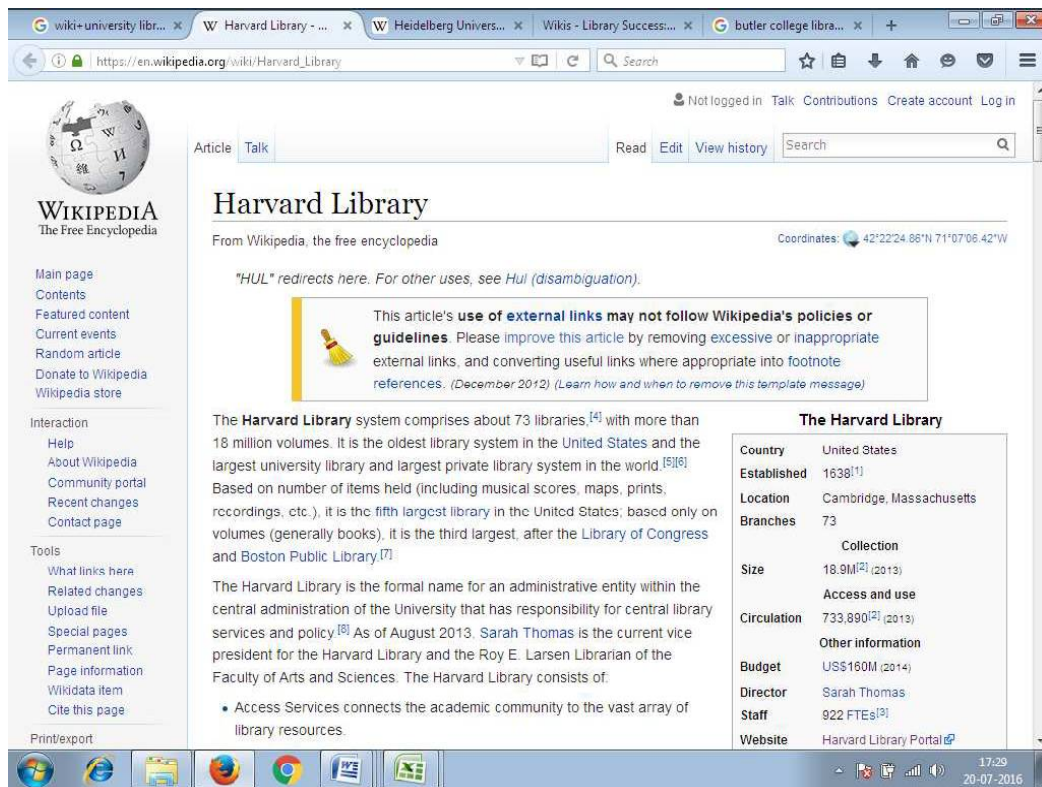
Screenshot 4.169: Staff wiki of Georgetown University library



Screenshot 4.170: Wiki page of Columbia University library

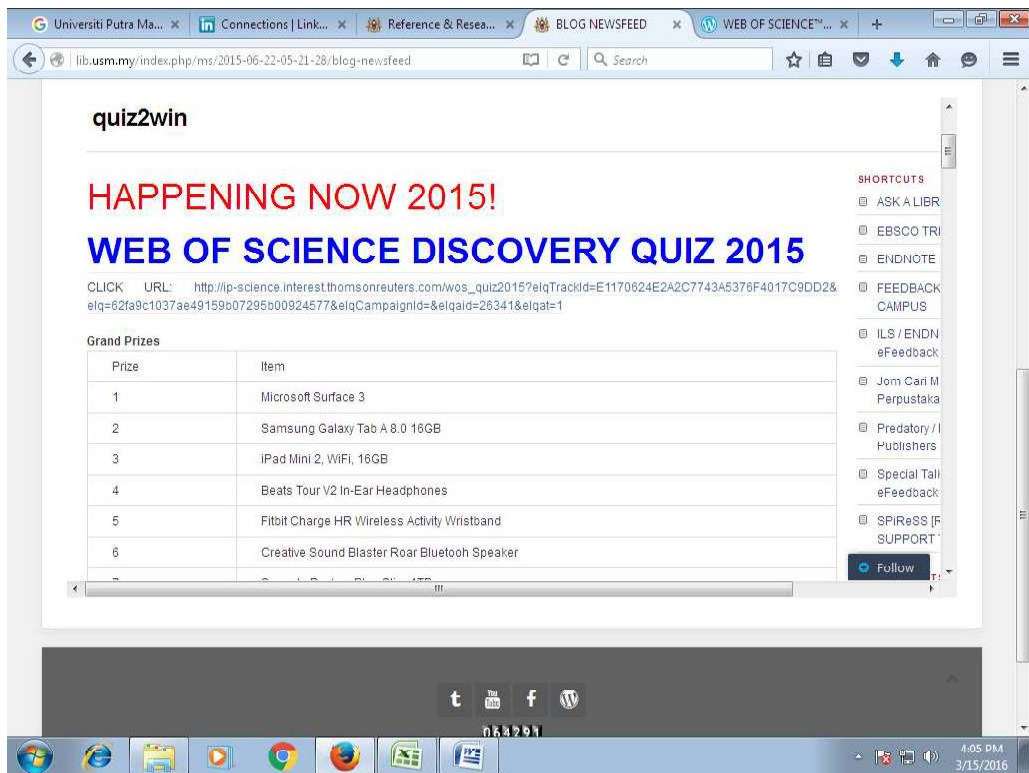


Screenshot 4.171: Wiki page of Harvard University library

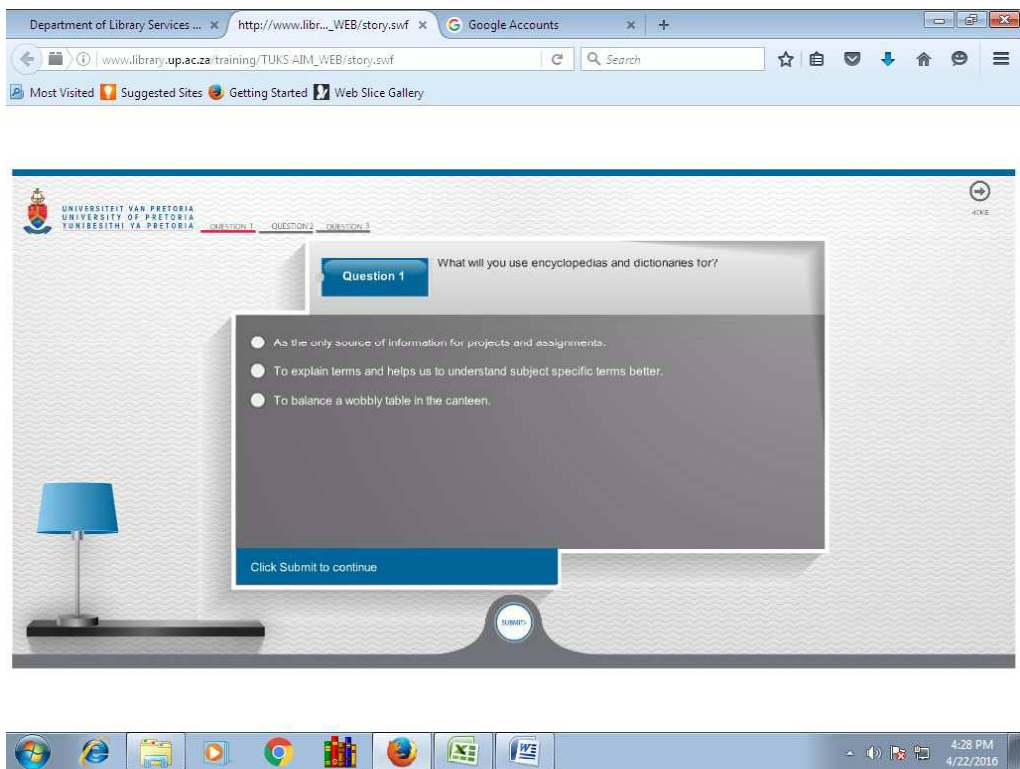


4.3.4. Interactive Games, Puzzles and Movie/Short Films: The University Libraries making the patron education more interesting by introducing interactive online quiz, games and puzzles and movie/short film. The University Sains Malaysia is inviting their patrons to participate in Web of Science discovery quiz. The University of Pretoria created an interesting interactive kind of online quiz and in which multiple choice based answers are given through which they get feedback also how patrons understand the library and use of the library. The University of Melbourne conducts a library orientation quiz every year so that patrons will know library more. Winners get prize. There are many free software available which can be used to create such puzzles, games and conduct quiz like Jigsaw Puzzle, Eclipse Crossword, iSpring, online quiz creator, Qzzr, Quizstar, ProProfs Quiz maker, etc.

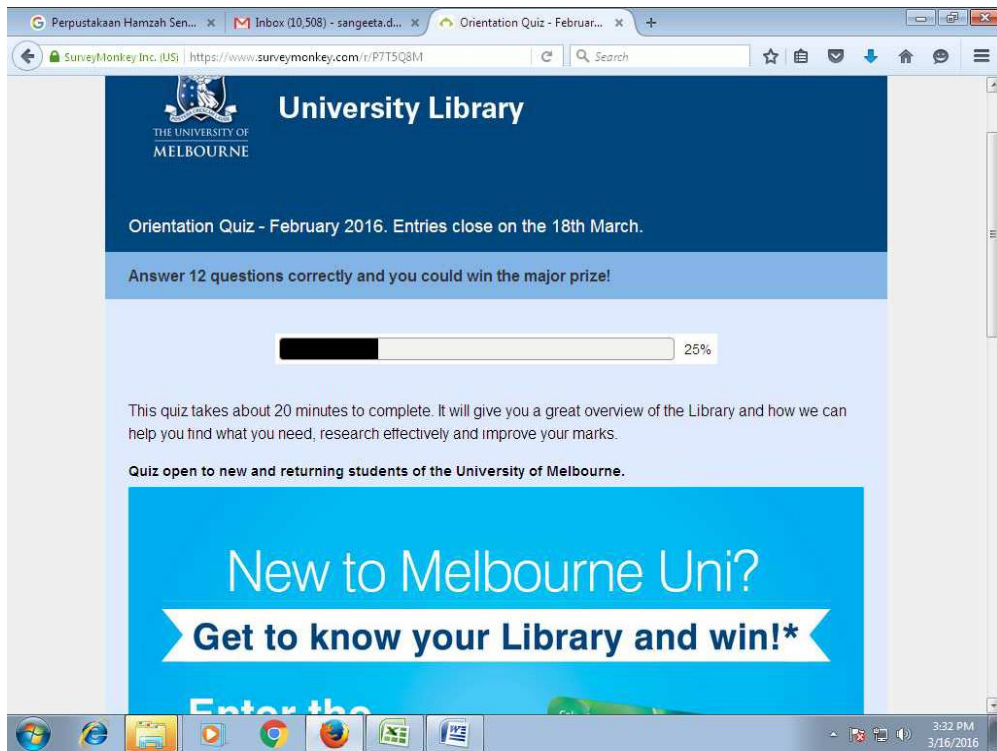
Screenshot 4.172: Online quiz competition at University Sains Malaysia library



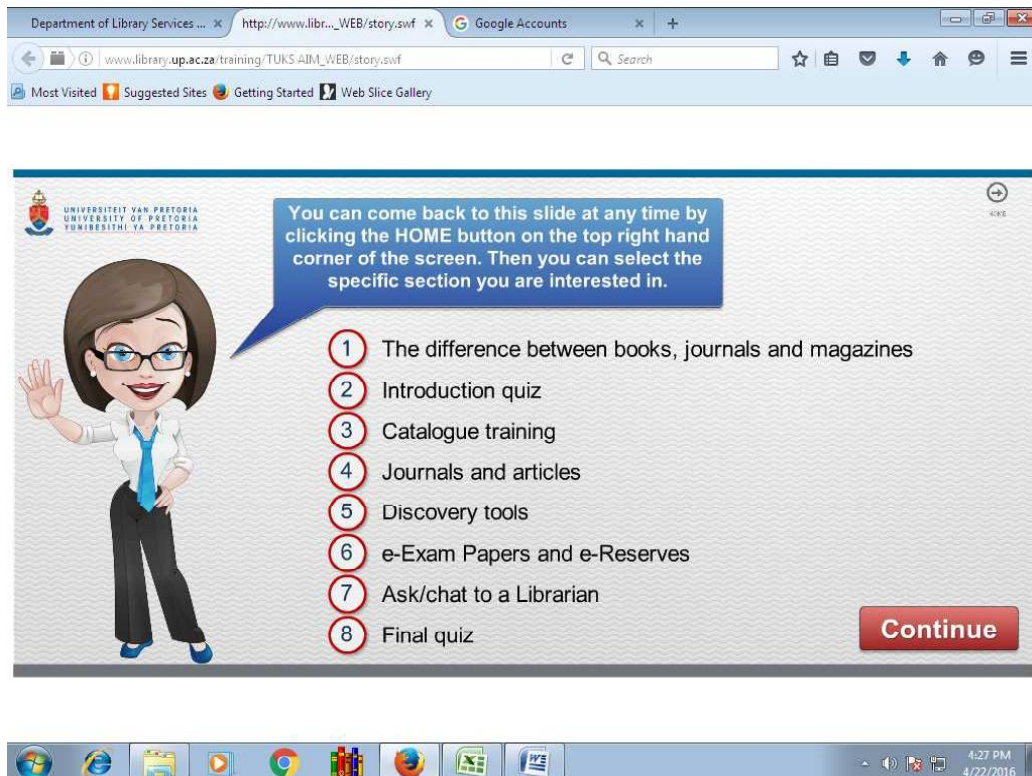
Screenshot 4.173: Interactive quiz competition at University of Pretoria



Screenshot 4.174: Orientation quiz at Melbourne University library



Screenshot 4.175: Online quiz at University of Pretoria library



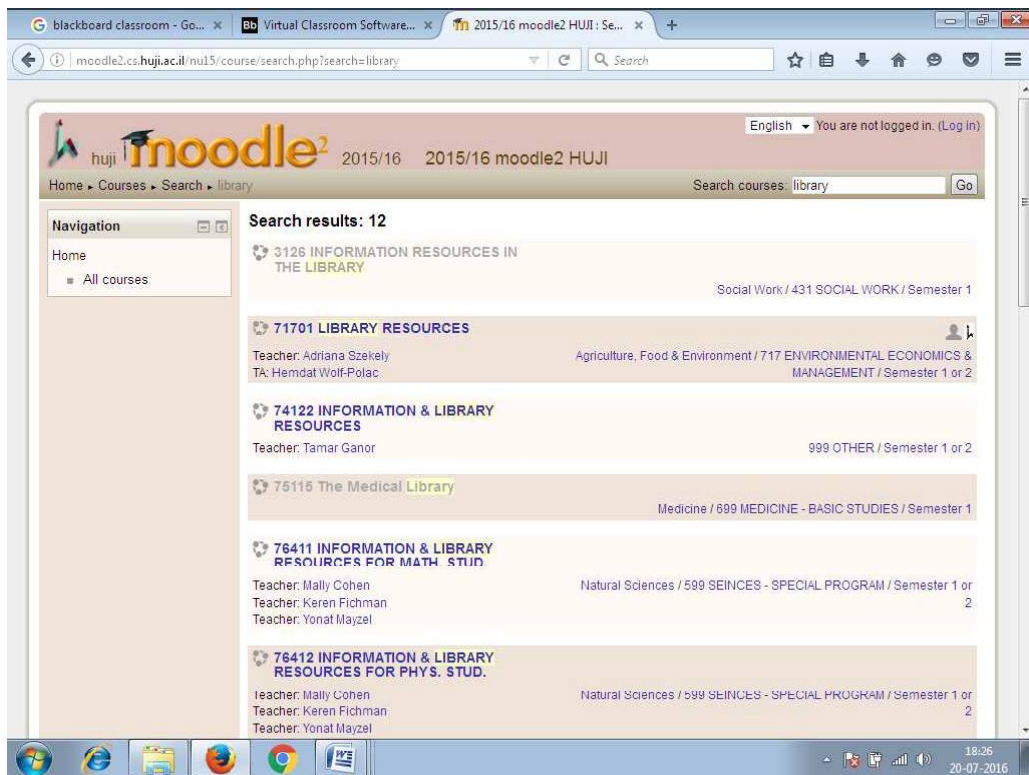
4.3.5. OTHER BEST PRACTICES

1. **Blackboard / Moodle /Open Courseware:** Blackboard is virtual classroom software. It is paid software many universities are using to conduct virtual classes in developed countries. The American University in Cairo took initiative to educate their patrons and engage them with reading material and instructional material and interact with them. Blackboard provides high quality audio and video sharing facility. Because it is paid software so very few libraries use this software to educate and conduct information literacy classes for patrons. Moodle is a free virtual classroom software and easy to use. The Hebrew university of Jerusalem library uses Moodle software to educate their patrons and conduct sessions. Similarly the Kyoto university library is using Open Courseware which is a free platform to publish course material.

Screenshot 4.176: Blackboard at the American University in Cairo library



Screenshot 4.177: Use of Moodle courses at Hebrew university of Jerusalem library



Screenshot 4.178: Use of Open Courseware at Kyoto University library



2. **Access or Borrow Rankings:** The Kyoto University practices to display Borrowed Ranking of reading material as well as Access Rankings on their website. This university also updates new reviews written by their patrons of books on their website.

Screenshot 4.179: Kyoto University display of Borrowed Rankings



Screenshot 4.180: Access rankings and new reviews at Kyoto University library

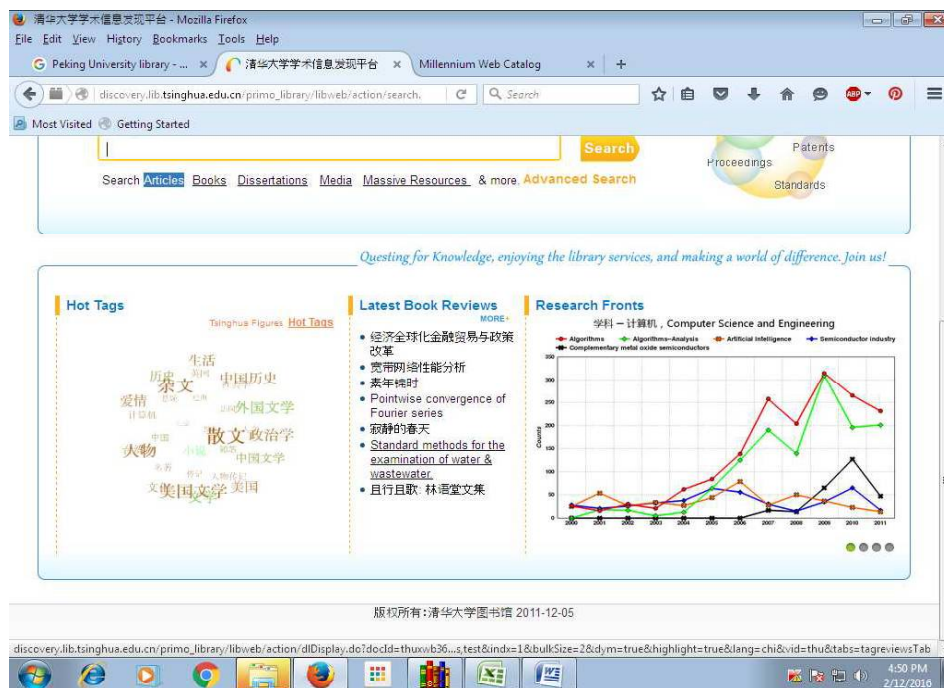


Screenshot 4.181: New collection reviews at Kyoto University library



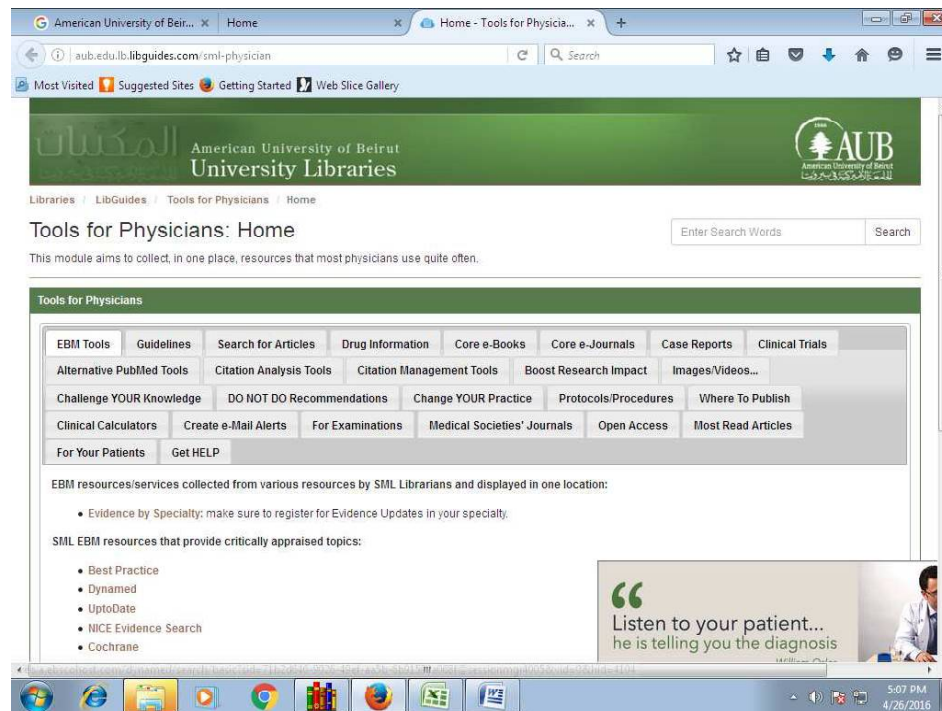
The Tsinghua University library practices to display latest books review on their website to inculcate reading habits among the students, to involve and attract readers in library activities.

Screenshot 4.182: Latest book reviews at Ksinghua University library



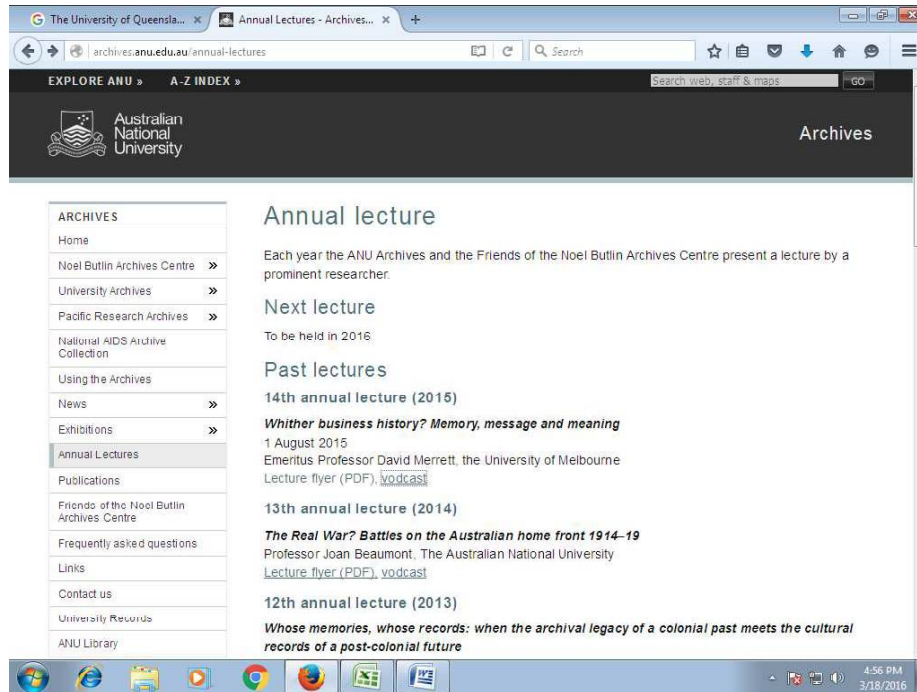
3. The American University of Beirut library has taken innovative steps to provide tools for physicians, nurses, public health users and patients along with subject guides and research support (American University of Beirut library). It's Saab Medical library conducts PubMed quiz in collaboration with PubMed for their patrons to create interest and increase use of PubMed.

Screenshot 4.183: Special tools for specific patrons at the American University of Beirut



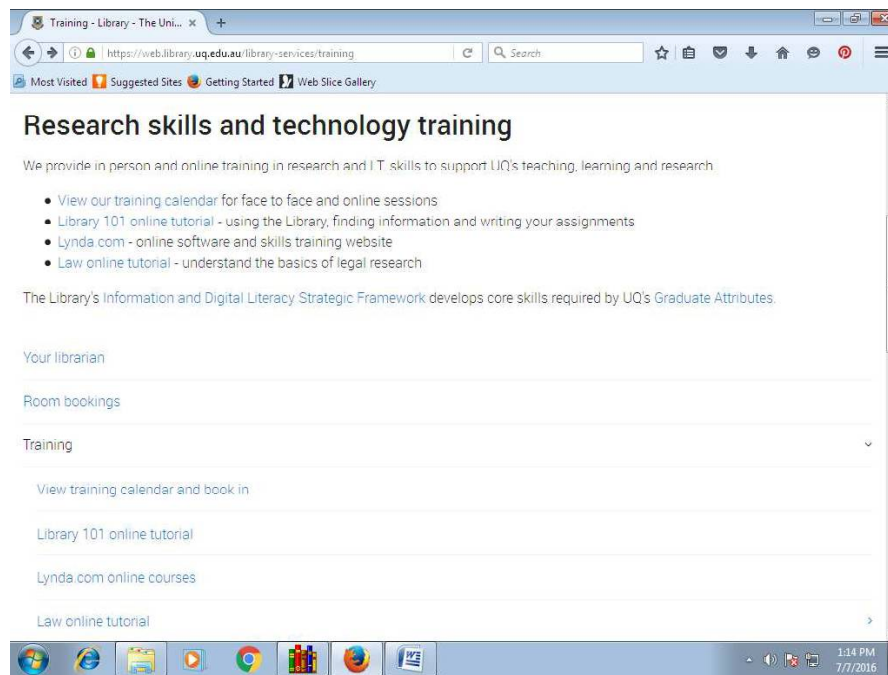
4. The Australian National University Library Archives Departments organize lecture of prominent researcher and all lecture archives made available on the library website for reference purpose in the vodcast format and lecture flyers in pdf format

Screenshot 4.184: Archive of Annual lectures organized by Australian National University library

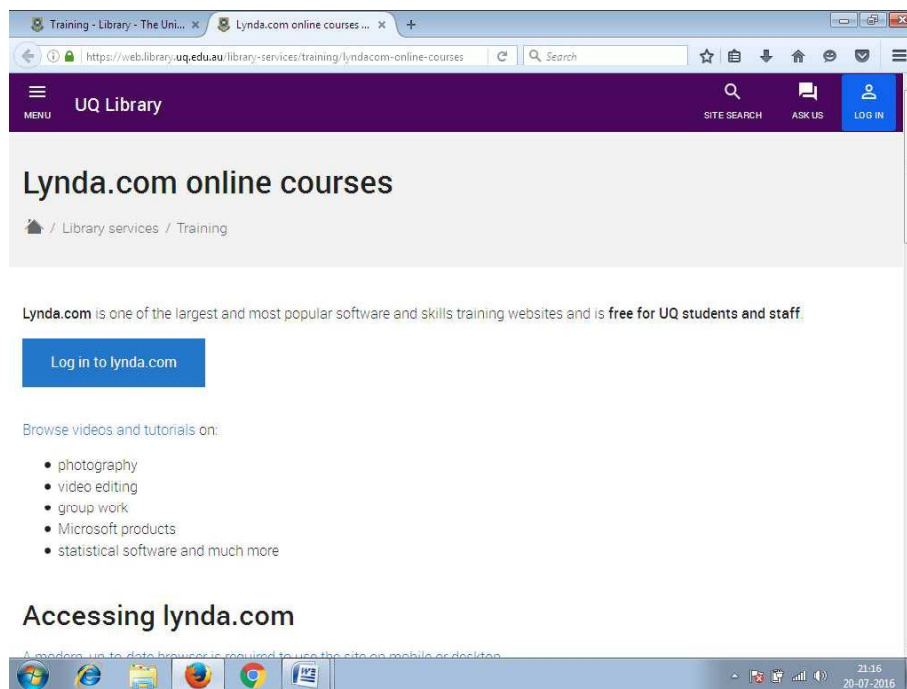


5. The University of Queensland provides online training in research and I.T. skills to support UQ's teaching, learning and research. University library uses "Lynda.com" software and skills training websites and is free for UQ students and staff. Alibrary created 101 online tutorials about locating and using your Library in different modules. Patrons can select the tutorial modules as per their requirement.

Screenshot 4.185: Skills training at Queensland University library



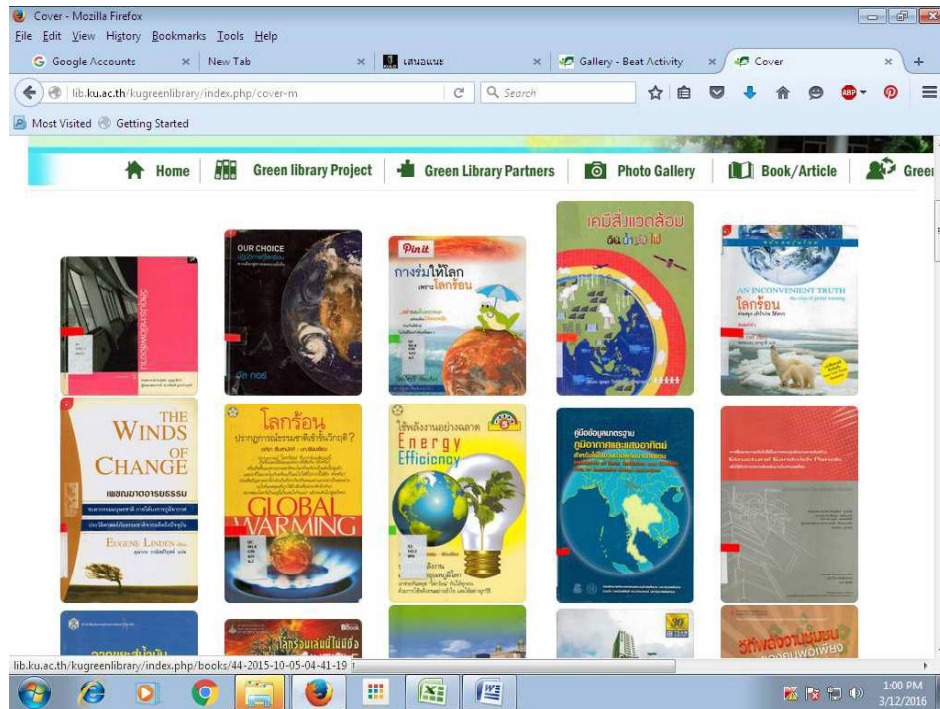
Screenshot 4.186: Lynda.com online courses at the University of Queensland library



6. A Kesetsart University's **Green Library** created webpage for all books cover pages. It helps readers to select the books. Also, this library organizes an annual event for every year and invites all pass out students. The KU library maintains statistical

records of services offered and made available to all on their website. To promote reading library form Reading Promotion Network.

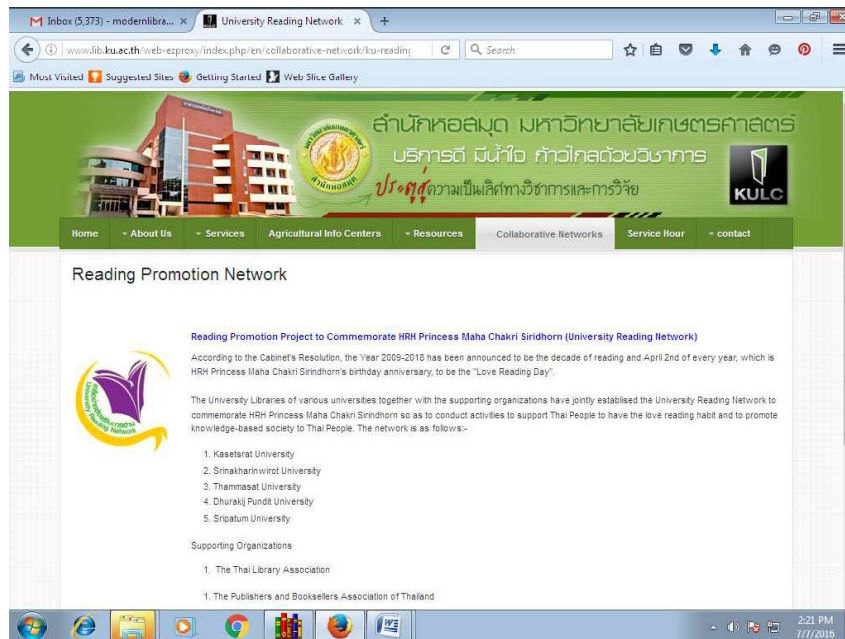
Screenshot 4.187: Green library project at Kesetsart University library



Screenshot 4.188: Display of statistics of library services at Kesetsart University

Services	Statistics	Unit
1. บริการยืม-คืนสิ่งพิมพ์	142,662	Items
2. บริการยืมสื่อ	25,767	Items
3. บริการจองหนังสือ	772	Items
4. บริการหนังสือด่วนแจ้ง	582	Items
5. บริการตอบคำถามและช่วยการค้นคว้า	2,356	Items
6. บริการยืมและถ่ายเอกสารระหว่างห้องสมุด	773	Times
7. บริการ e-Request	27	Transactions
8. บริการสืบค้นข้อมูล	1,099	Items
9. บริการสอนการใช้ห้องสมุด	861	Persons
10. บริการนำชมสำนักหอสมุด	722	Persons
11. บริการปฐมวัยเทคโนโลยีการใช้ห้องสมุด	3,245	Times
12. บริการฝึกอบรมการสืบค้นสารสนเทศ	662	Items
13. บริการใช้สิ่งพิมพ์ภายในห้องสมุด		
- หนังสือขึ้นทั่วไป ภาษาไทย	169,799	Items
- หนังสือขึ้นทั่วไป ภาษาต่างประเทศ	32,777	Items

Screenshot 4.189: Reading promotion network by Kesetsart University Green Library



7. The King Abdul Aziz University has separate libraries for women and men. This university conducts reading marathon competition and shows no. of visitors to the library website.

Screenshot 4.190: Genderwise King Abdul Aziz University libraries

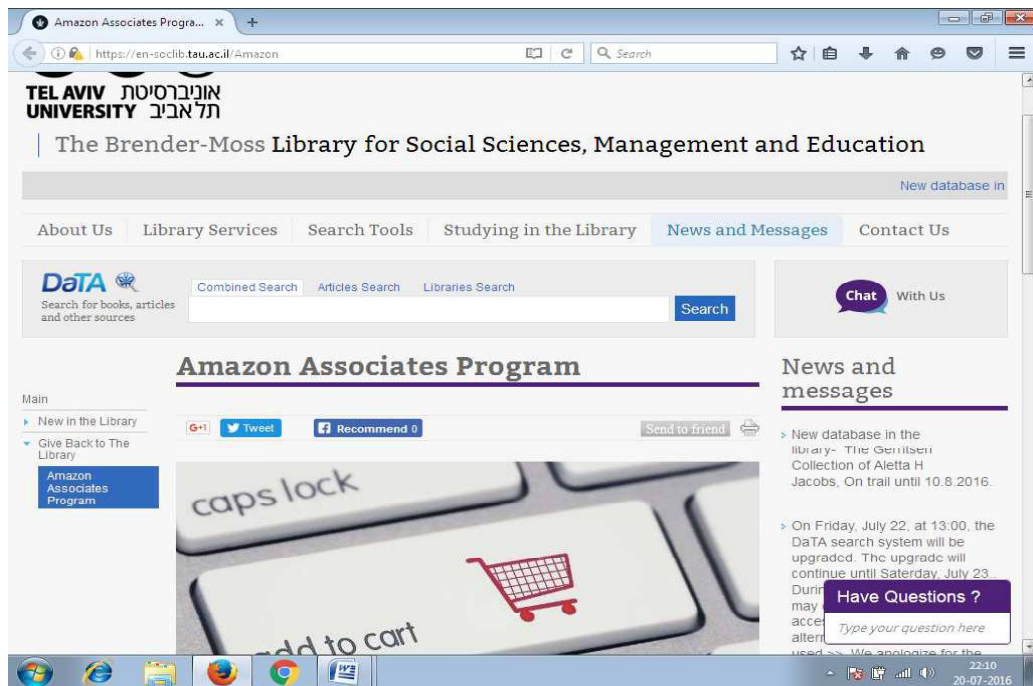


8. **Amazon Associate Program:** Amazon is providing links to libraries. That link library provide on their website. If readers or library buys books and all other kinds of products using the link allotted to university 5% amount of the total purchase is added to the library account with a few terms and conditions. The Tel Aviv University and many other Israel universities participating in the Amazon Associates Program and earning financial benefits.

Screenshot 4.191: Amazon Associate Program at Tel Aviv University library

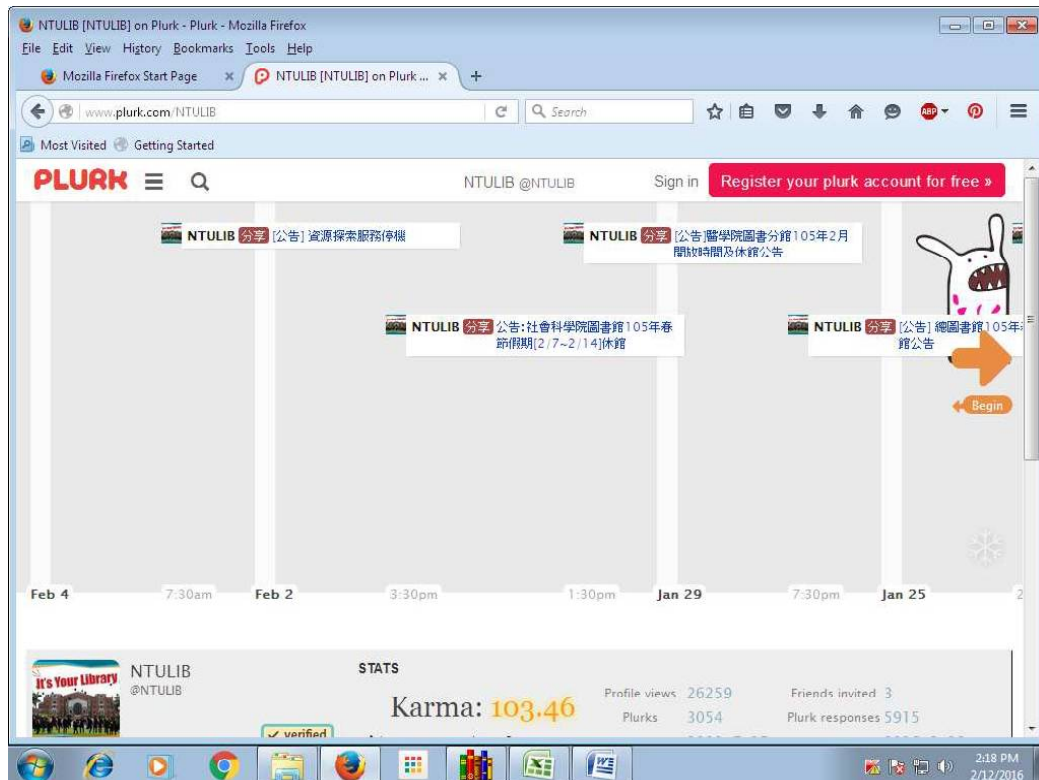


Screenshot 4.192: Tel Aviv University libraries associate program with Amazon



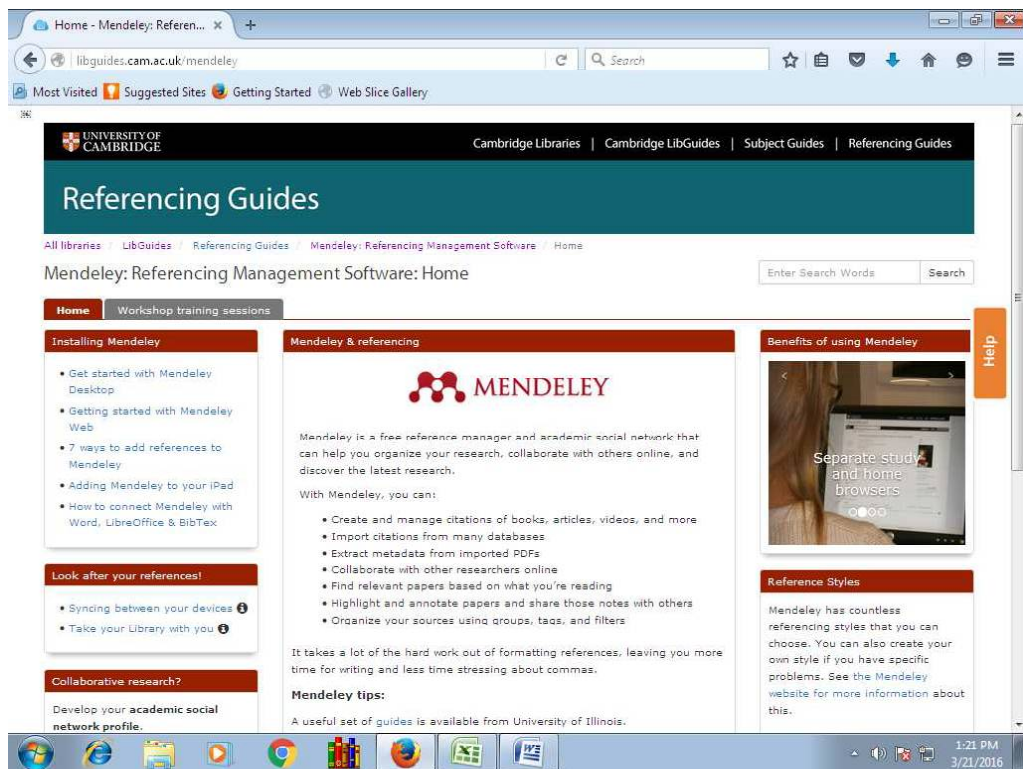
9. **Plurk:** Unlike all other free social network services like Facebook, Twitter, Foursquare, Stumbleupon, etc. mentioned above NTU Library uses Plurk free social networking and micro-blogging service (Screenshot 4.193) that allows libraries to send updates through short messages or links (Wikipedia).

Screenshot 4.193: Plurk patron communication platform by NTU library

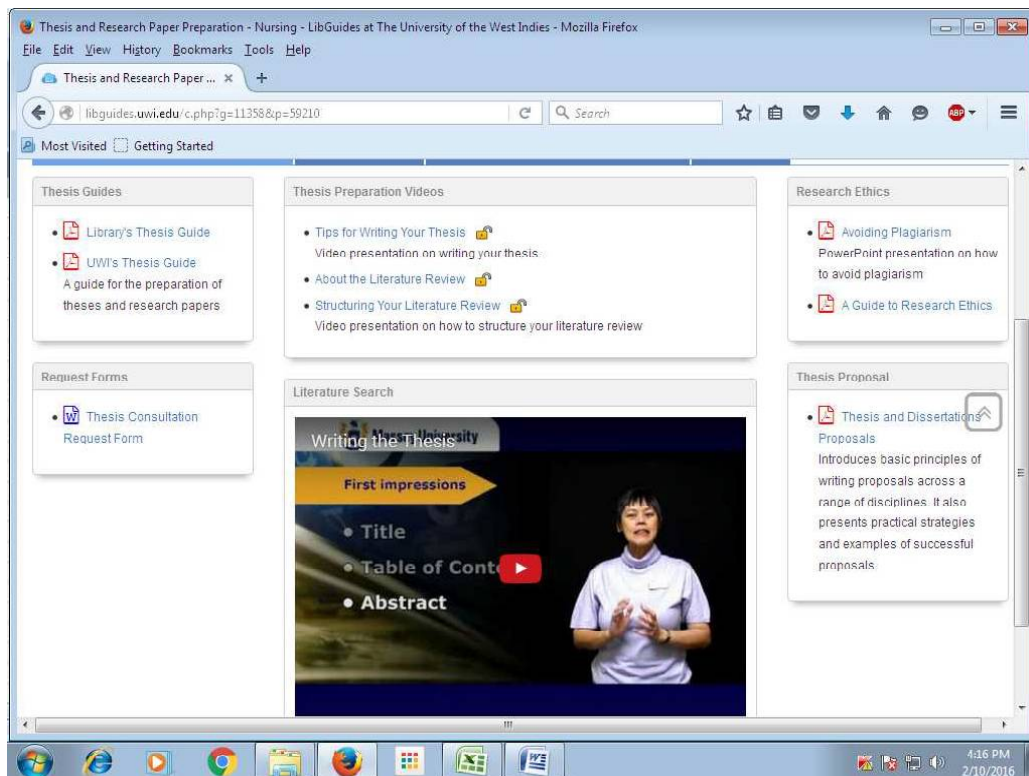


10. **Writing and Referencing:** Similar to Citations and plagiarism related help university libraries also playing an important role in providing writing and referencing related help and services. Patrons can avail this facility and refer the guides, instructions, tutorials provided by libraries while writing their projects, theses, academic papers, patents, standards, trademarks.

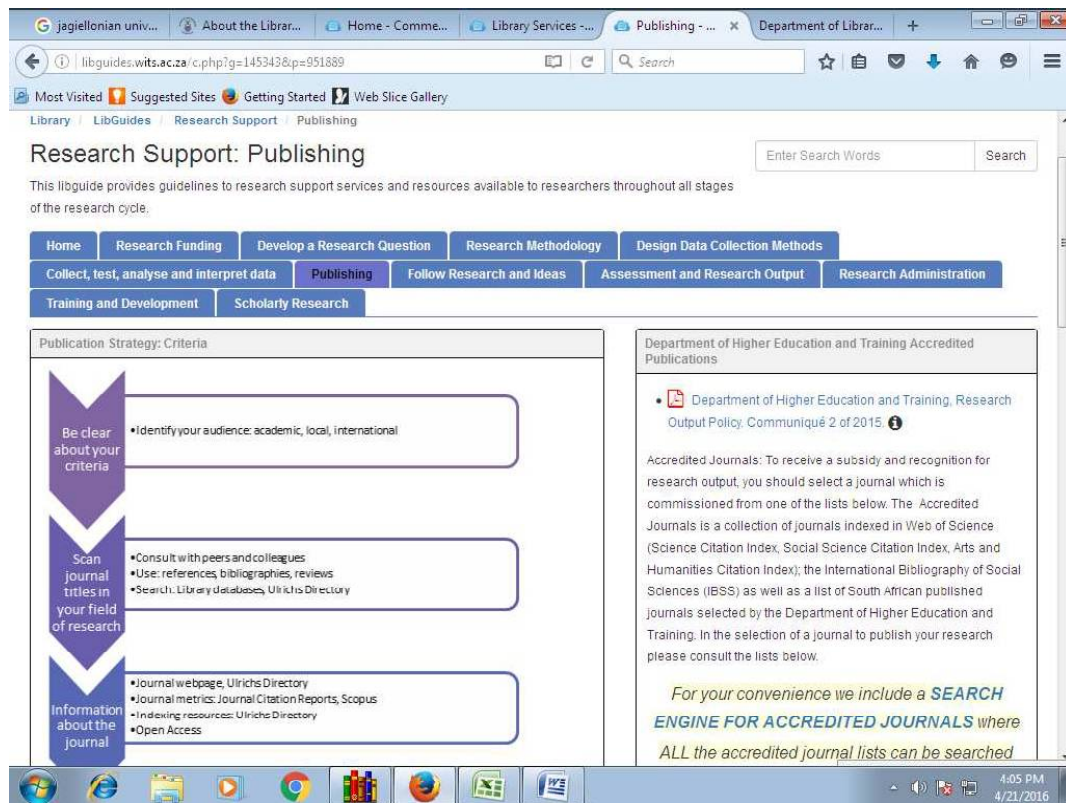
Screenshot 4.194: Referencing guides by Cambridge University



Screenshot 4.195: Referencing guides by University of West Indies



Screenshot 4.196: Referencing guides by University of Witwatersrand

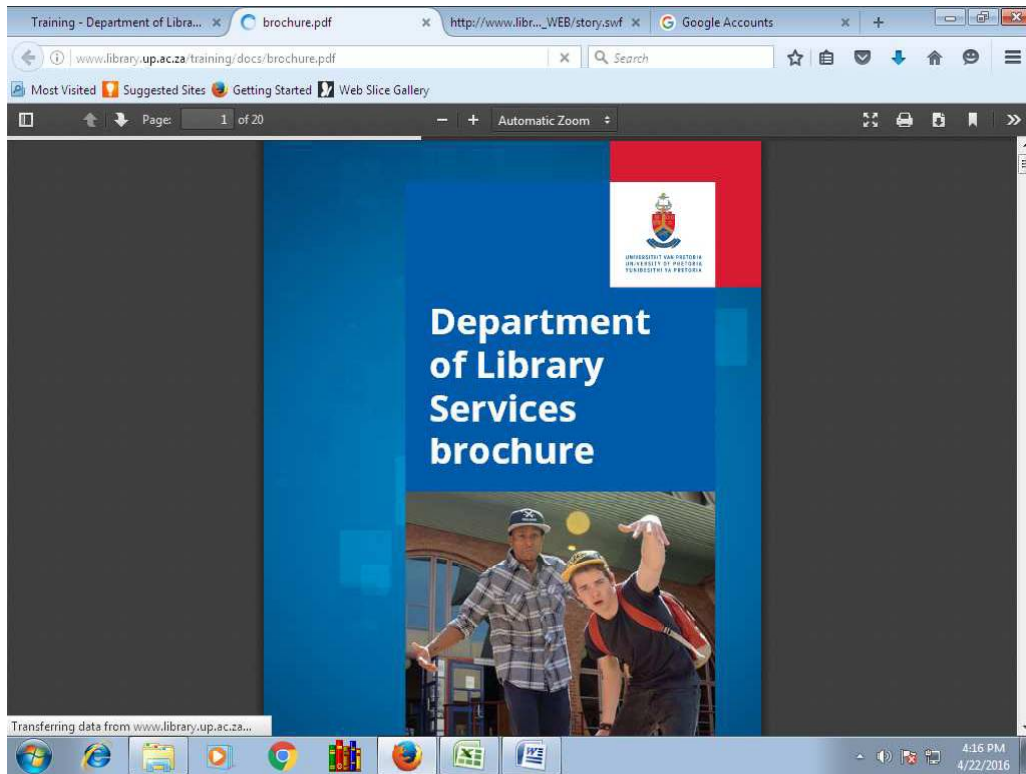


11. E-Brochure: Every library prepares two, three, four or multiple fold brochures for their patrons and visitors for publicity and also marketing purpose. It contains all information about library along with a few photos. Many top university libraries give these brochures to all visitors. It is mirror of that library. Along with print university libraries uploads these brochures in PDF form on their website. The brochure gives a quick view of the library and its services. Those readers who do not have much time to read all the library webpages library brochure helps them to understand the library. As it is easy to upload brochures university prepares brochure for separate sections, departments, services too. Few examples of library e-brochures are given here in screenshot form.

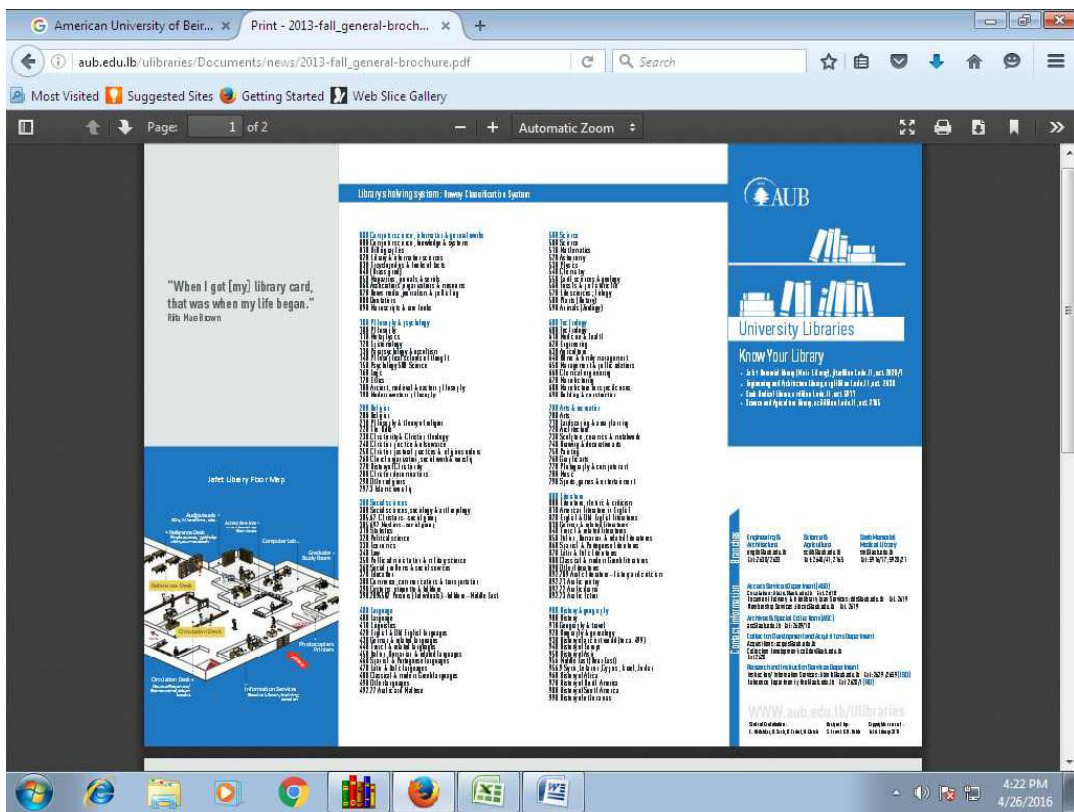
Screenshot 4.197: e-brochure of Seoul National University library



Screenshot 4.198: e-brochure of library services of the University of Pretoria



Screenshot 4.199: e-brochure of the American University of Beirut



4.4. SINGLE WEB PAGE UNIVERSITY LIBRARIES:

All libraries are now presenting them on the web and market their services through web. But all libraries are not technologically sound and able to provide web based services because of various reasons like web sites are maintained by other agencies, university not providing all support for the library website, lack of technologically sound staff in the library, no separated web librarian post in university libraries, etc. It is compulsory to all educational institutes to give information about various departments including library on their website. Many times the websites are managed by other companies. The data provided to them are reflected on the website. Not all library staff is active to update library information on the website. Most of the time library date is so much and it needs a separate website to embed software and search tools with digital resources. So many universities have separate websites managed by library software providers.

Many universities are just providing information about library on their website, creating one web page. The university libraries that have only a single web page without any additional web links or hyperlinks are listed here. Many libraries in developing countries have only a single web page stating its aim, objective, collection statistics and staff information along with services and facilities offered very briefly and never bothered to update it time to time. Below are examples of the Kakatia University library, Warangal, India gives introduction, sections and librarians name of librarian with photo. But no contact details are mentioned on a single web page. No links are provided for webopac or other library website. One more webpage is created on University website for a list of e-journals and databases. Another example is of the Bharati Vidyapeeth, India gives information about libraries and statistical details of the collection available to its branch libraries. As mentioned in the beginning of this chapter the data collected are not covered intranet services or within campus services which are not listed on the library website.

Screenshot 4.200: Web page of Bharati Vidyapeeth library

The screenshot shows a web browser window displaying the Bharati Vidyapeeth library website. The main content area is titled 'Library' and features a 'Knowledge Assets' section. This section includes a paragraph about the university's commitment to knowledge and a table with columns A through F representing different metrics. A legend explains these metrics: A (Total Number of Books), B (Total Number of Volumes), C (Total Number of International Journals), D (Total Number of National Journals), E (Number of books added in 2011 - 12), and F (Cost spent on books in 2011 - 12). The table lists various institutes and their corresponding values for each metric.

On the right side of the page, there is a 'Select a Course' sidebar with a dropdown menu for 'Course Level' (set to 'Under Graduate') and 'Course Discipline' (set to 'Architecture'). Below this is a list of course categories including Hospital Administration, Medical, Dental, Ayurved, Homeopathic, Nursing, Engineering, Management, Pharmaceutical, Social Science, Environment Science, Geo Informatics, and Physical Education.

Name of the Institute	A	B	C	D	E	F
Medical College, Pune	13272	2180	93	46	391	9,38,289
Dental College and Hospital, Pune	5787	1260	60	17	329	6,20,807
College of Ayurved, Pune	17535	272	4	24	963	3,67,547
Homeopathic Medical College, Pune	10933	2454	09	60	991	6,04,163
College of Nursing, Pune	5921	150	30	70	421	918907
Yashwantrao Mohite College of Arts, Science & Commerce, Pune	26270	26270	4	38	954	221,264
New Law College, Pune	12805	225	3	28	577	3,03,435

Screenshot 4.201: Webpage of Kakatiya University library

The screenshot shows the website for Kakatiya University Library. At the top, there is a green banner with accreditation details: 'ACCREDITED BY NAAC WITH 'A' GRADE' and 'NAAC - Accreditation Report-2016'. Below this is the university's logo and name, 'KAKATIYA UNIVERSITY, Warangal-506009, Telangana, India.', along with a NAAC 'A' Grade logo. A navigation menu includes Home, About KU, Administration, Academics, Facilities, Examinations, SDICE, E-Journals, Photo Gallery, and Contact Us. The main content area is titled 'Home » University Library' and contains an introduction, a list of sections, and a profile picture of P. Yugender Rao, In-charge. A sidebar on the left lists various facilities like University Library, Computer Center, and Instrumentation Centre.

4.5. CONCLUSION:

The overview of all the web-based library services and best practices shortlisted for this study was discussed here in detail using screenshots of those services offered by different libraries in different ways. While reading this chapter, the readers will understand how the specific service is offered by university libraries in the globe and how these services are user centric and beneficial in the future to attract users, reach patrons and make maximum use of library resources.

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Chapter5

**A QUANTITATIVE ANALYSIS
OF LIBRARY WEB-SERVICES
AND BEST PRACTICES
RELATED TO THE
UNIVERSITY LIBRARIES
CONTEXT**

CHAPTER 5

A QUANTITATIVE ANALYSIS OF LIBRARY WEB-SERVICES AND BEST PRACTICES RELATED TO THE UNIVERSITY LIBRARIES CONTEXT

5.1. INTRODUCTION

The Chapter 5 is dedicated to quantitative analysis of web-based services and best practices related to the top world and Indian University library context. In this chapter the investigator dealt with how quantitative data analysis is carried out using different techniques and statistical tests to find out results and findings.

The investigator collected the raw data in the form of the inventory of 64 web-based services and best practices offered by the sample of 70 traditional University libraries in the ‘World’ and 39 traditional University libraries in India by thoroughly going through their websites, blogs as well as using the Google platform and web 2.0/ social network online service provider’s account.

Sample of world ranked universities:

To select global sample of the top world university libraries, the investigator used ‘**Webometrics Ranking of World Universities**’ and selected each 5 top ranked universities from each area of the world. Total 70 top universities spread evenly all over the world are selected. These 70 universities are ranked manually as per their ‘Webometric Rank’ for the research purpose.

These are listed in below table 5.1.

Table 5.1: List of sample world university libraries with their ranks

Sr. No	Country	University Name	Webometric Rank	Univ Rank
1	World	Harvard University	1	1
2		Stanford University	2	2
3		University of California Berkeley	3	3
4		Cornell University	4	4

5		University of Michigan	5	5
6	Brics	Universidade de São Paulo USP	34	10
7		Peking University	47	13
8		Tsinghua University China	49	14
9		Zhejiang University (National Che Kiang University)	65	18
10		Shanghai Jiao Tong University	83	21
11	Civets	Istanbul University	277	40
12		University of Cape Town	328	43
13		Stellenbosch University	462	46
14		Universidad Nacional de Colombia	473	47
15		Cairo University	474	48
16	Latin America	Universidad Nacional Autónoma de México	56	16
17		Universidad de Chile	152	30
18		Universidade Estadual de Campinas UNICAMP	175	33
19		Universidade Federal do Rio Grande do Sul UFRGS	185	34
20		Universidade Federal do Rio de Janeiro	266	39
21	Caribbean	Universidad de Puerto Rico (UPR)	593	53
22		University of the West Indies	895	57
23		Universidad de Puerto Rico Mayaguez	945	58
24		Universidad de la Habana	1680	68
25		University of the West Indies at St Augustine	1875	70
26	Asia/Pacifico	National Taiwan University	30	9
27		Seoul National University	51	15
28		University of Tokyo	60	17
29		University of Hong Kong	82	20
30		Kyoto University / 京大	87	23
31	Middle East	Hebrew University of Jerusalem	207	35
32		Tel Aviv University	221	37
33		King Saud University	244	38
34		University of Tehran	363	44
35		Ben Gurion University of the Negev	583	52
36	South East Asia	National University of Singapore	116	28
37		Kasetsart University	213	36
38		Mahidol University	308	42
39		Universiti Putra Malaysia	420	45
40		Universiti Sains Malaysia	480	49

41	Oceania	University of Melbourne	80	19
42		University of New South Wales	85	22
43		University of Queensland	92	24
44		Australian National University	99	26
45		Monash University	114	27
46	Europe	University of Cambridge	15	6
47		University of Oxford	16	7
48		University College London	24	8
49		University of Helsinki / Helsingin yliopisto	42	11
50		Utrecht University / Universiteit Utrecht	45	12
51	Central Eastern Europe	Charles University in Prague / Univerzita Karlova v Praze	96	25
52		Lomonosov Moscow State University	129	29
53		University of Ljubljana / Univerza v Ljubljani	168	31
54		Masaryk University in Brno / Masarykova Univerzita v Brně	170	32
55		Jagiellonian University / Uniwersytet Jagielloński	287	41
56	Africa	University of Pretoria	494	50
57		University of the Witwatersrand	563	51
58		University of Kwazulu Natal	830	55
59		University of Nairobi	855	56
60		University of the Western Cape	1022	60
61	North Africa	American University in Cairo	1050	61
62		Mansoura University	1167	63
63		Benha University	1419	66
64		Alexandria University	1448	67
65		Université Djillali Liabes	1781	69
66	Arab_world	King Abdulaziz University	780	54
67		American University of Beirut	989	59
68		United Arab Emirates University	1061	62
69		University of Jordan	1263	64
70		University of Baghdad	1350	65

Sample of the Indian “A” grade universities:

To select top universities in India NAAC “A” Grade with CGPA score more than 3.0 criteria was applied and total 39 traditional universities were shortlisted from different states. According to their CGPA score of NAAC, they are ranked manually and shown in below table 5.2.

Table 5.2: List of sample Indian university libraries with their NAAC ranks

Sr. No	State	Abbreviations	University Names	CGPA Score	NAAC Rank
1	Andhra Pradesh	UOH	University of Hyderabad	3.72	3
2		KLEF	Koneru Lakshmaiah Education Foundation Deemed University	3.16	12
3		SVU	Sri Venkateswara University	3.13	15
4		SSSI	Sri Sathya Sai Institute of Higher Learning (Deemed University)	3.06	21
5		KKU	Kakatiya University	3.02	24
6	Haryana	GJUST	Guru Jambheshwar University of Science and Technology	3.26	9
7		MDU	Maharishi Dayanand University	3.03	23
8	Jammu & Kashmir	JU	Jammu University	3.13	15
9		KU	Kashmir University	3.11	17
10	Karnataka	MU	Mysore University	3.47	5
11		JSSU	Jagadguru Sri Shivarathreeswara University	3.34	7
12		KLEAHER	KLE Academy of Higher Education and Research (Deemed University)	3.16	12
13		NITTEU	NITTE University	3.11	17
14		KNU	Kannada University	3.02	24
15	Madhya Pradesh	DAV	Devi Ahilya Vishwavidyalaya	3.09	19
16	Maharashtra	TISS	Tata Institute of Social Sciences	3.88	2
17		IGIDR	Indira Gandhi Institute of Development Research	3.64	4
18		PDYPV	Padmashree Dr. D.Y. Patil Vidyapeeth	3.35	6
19		SIU	Symbiosis International University	3.35	6

20		BV	Bharati Vidyapeeth	3.16	12
21	Meghalaya	NEHU	North Eastern Hill University	3.03	23
22	Mizoram	MZU	Mizoram University	3.12	16
23	Orissa	SOA	Shiksha O' Anusandhan(Deemed University)	3.10	18
24	Rajasthan	JVBU	Jain Vishva Bharati Institute(Deemed University)	3.11	17
25		BV	Banasthali Vidyapith	3.02	24
26	Tamilnadu	AU	Algappa University	3.21	11
27		BU	Bharathidasan University	3.16	12
28		Bhartiyar Univ	Bharathiyar University	3.02	24
29		GRI	Gandhigram Rural Institute(Deemed University)	3.02	24
30		AVINUTY	Avinashilingam Institute for Home Science & Higher Education for Women (Deemed University)	3.01	25
31	Uttar Pradesh	DEI	Dayalbagh Educational Institute(Deemed University)	3.14	14
32		AUN	Amity University	3.13	15
33	West Bengal	CU	Calcutta University	3.30	8
34	NCT of Delhi	JNU	Jawaharlal Nehru University	3.91	1
35		TSAS	TERI School of Advanced Studies (Deemed University)	3.26	9
36		RSS	Rashtriya Sanskrit Sansthana (Deemed University)	3.25	10
37		JHU	Jamia Hamdard University	3.08	20
38		GGSIU	Guru Gobind Singh Indraprastha Vishwavidyalaya	3.05	22
39	Pondicherry	PU	Pondicherry University	3.15	13

In order to analyze the 64 web-based services and practices, the investigator clustered these services into three parts mentioned as below:

Part A: Web-based library services- (List given in Research Methodology Chapter)

Part B: Web-based best practices- (List given in Research Methodology Chapter)

Part C: Single web page university library- (List given in Research Methodology Chapter)

Different data analysis techniques like cross-tabulating for average scores and Spearman correlation coefficient and tests like Chi-Square Test and T-Test were applied to the raw data collected and the results are discussed in this chapter thoroughly. For details about these tests, please refer Chapter 3 'Research Methodology'.

PART A:

5.2. DATA ANALYSIS OF LIBRARY WEB-BASED SERVICES:

An inventory of library web-based services offered by the sample 'world' and 'Indian' libraries are clustered in four parts, namely web-based bibliographical services, web-based patron education tools / services, web-based patron communication tools / services and web-based publishing platform for patrons.

The data analysis of web-based services offered by 'world' and 'India' has been carried out in three parts. In the first part, the analysis of the percentages of each service offered by the world and Indian University libraries is presented in cross-tabulation form. In the second part the analysis of probability value and Chi-Square value is calculated by applying Chi-Square tests and T-test for the total of each cluster. In last third part the Spearman correlation coefficient is calculated for Universities rankings and library rankings given on the basis of web-based services offered.

5.2.1: DATA ANALYSIS OF WEB-BASED BIBLIOGRAPHICAL SERVICES:

5.2.1.1. Access to web OPAC:

Table 5.3 shows that 43.6% Indian libraries and 97.1 % University libraries from different parts of the world gives access to the web OPAC to their patrons.

Table 5.3: % (count) of library websites giving web OPAC service

Graph 5.1 % score for giving Web Opac

			Web OPAC		Total
			No	Yes	
Area	India	Count	22	17	39
		% within Area	56.4%	43.6%	100.0%
	World	Count	2	68	70
		% within Area	2.9%	97.1%	100.0%
Total	Count	24	85	109	
	% within Area	22.0%	78.0%	100.0%	

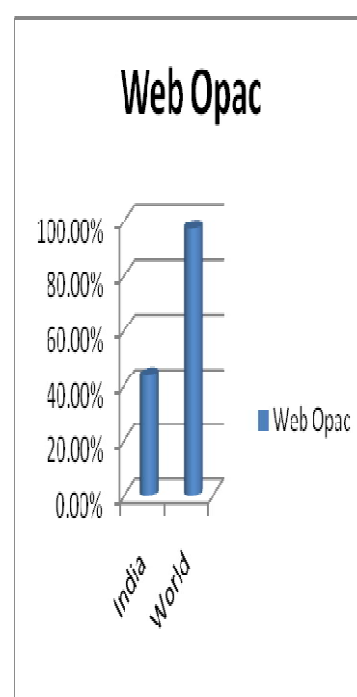


Table 5.4 Chi-Square test table shows Chi-Square value of web OPAC service was $\chi^2 = 41.834$ and $p = .001$ which was quite significant at 0.05 significance level and have a strong association between the web OPAC services provided by University Libraries and area wise i.e. world and India.

Table 5.4: Chi-Square Tests for web OPAC service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	41.834 ^a	1	.001		
Continuity Correction ^b	38.773	1	.000		
Likelihood Ratio	43.330	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.1.2. Access to databases:

Table 5.5 shows that there were 21 (53.8%) Indian University libraries and 91.4 % University libraries from different parts of the world provide access to databases, whereas an overall total score of University libraries offering access to databases was 78 %.

Table 5.5: % (count) of library websites giving access to databases Graph 5.2 % score of Access to Databases

			Access to Databases		Total
			No	Yes	
Area	India	Count	18	21	39
		% within Area	46.2%	53.8%	100.0%
	World	Count	6	64	70
		% within Area	8.6%	91.4%	100.0%
Total		Count	24	85	109
		% within Area	22.0%	78.0%	100.0%

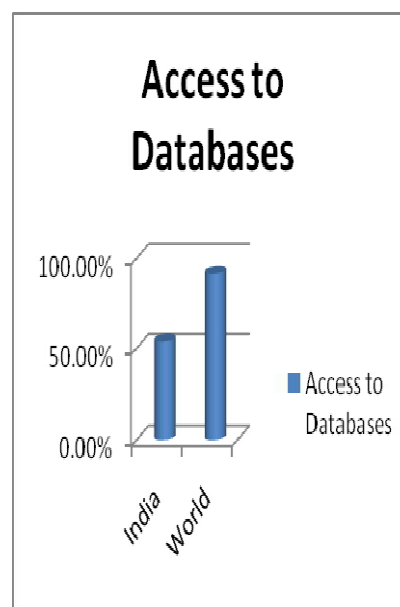


Table 5.6, Pearson Chi-Square value (χ^2) was 20.603, which was statistically significant at 0.05 significance level ($p = .001$). This indicates that the proportion of

providing access to databases by top World and Indian University libraries was statistically different from each other.

Table 5.6: Chi-Square Tests for Access to Database data

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.603 ^a	1	.001		
Continuity Correction ^b	18.472	1	.000		
Likelihood Ratio	20.131	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.1.3. Federated search/Information discovery tools:

Table 5.7 shows that there were 11 (28.2%) top Indian University libraries provide federated search or information discovery tools for searching the information and on the contrary 82.9 % libraries from different parts of the world provide these tools.

Table 5.7: % (count) of library websites providing federated Search/information discovery tools

			Federated / Information discovery tools		Total
			No	Yes	
Area	India	Count	28	11	39
		% within Area	71.8%	28.2%	100.0%
	World	Count	12	58	70
		% within Area	17.1%	82.9%	100.0%
Total		Count	40	69	109
		% within Area	36.7%	63.3%	100.0%

Graph 5.3. % score of access to federated search/ e-discovery tool

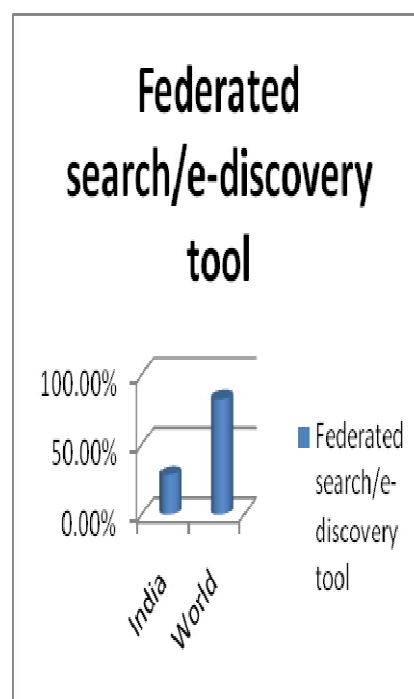


Table 5.8 shows Pearson Chi-Square value (χ^2) is 32.203, probability ratio is .001 which indicates that the proportion of giving access to federated search or information

discovery tools by world and Indian University Libraries was statistically different from each other.

Table 5.8: Chi-Square Tests for federated Search/information discovery tools

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	32.203 ^a	1	.001		
Continuity Correction ^b	29.893	1	.000		
Likelihood Ratio	32.756	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

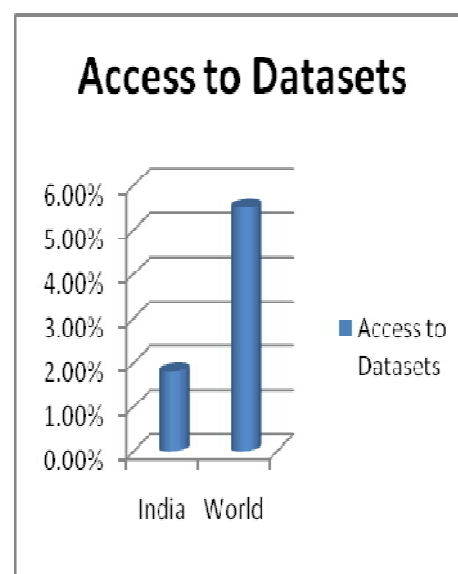
5.2.1.4. Datasets:

Table 5.9 shows that that only 6 world University libraries out of 70 i.e. 5.5% universities offers dataset services to their patrons where as only 1.8% University libraries from India took efforts to create and maintain datasets in their libraries. The overall score is 7.3%.

Table 5.9: % (count) of library websites providing access to datasets

			Datasets		Total
			No	Yes	
Area	World	Count	64	6	70
		% of Total	58.7%	5.5%	64.2%
	India	Count	37	2	39
		% of Total	33.9%	1.8%	35.8%
Total		Count	101	8	109
		% of Total	92.7%	7.3%	100.0%

Graph 5.4. % score of access to datasets



The Pearson Chi-Square value is 0.437 for Dataset service offered by University libraries and probability value (p=.509) shown in table 5.10 is statistically not significant and not shows strong association between two variables i.e. world and India.

Table 5.10: Chi-Square Tests for Access to Datasets

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.437a	1	.509		
Continuity Correction ^b	.077	1	.781		
Likelihood Ratio	.460	1	.498		
Fisher's Exact Test				.709	.404
N of Valid Cases	109				

5.2.1.5. Archives / Digital Collection / IR

In total a 66.1% score of University libraries has their archives/digital collection and gives access to their institutional repositories. Table 5.11 shows that from 'world' samples 87.1% and from 'India' 28.2% University libraries have their archives and institutional repositories.

Table 5.11: % (count) of library websites offering access to archives/ digital collection/ IR

			Archives /Digital Collection/IR		Total
			No	Yes	
Area	India	Count	28	11	39
		% within Area	71.8%	28.2%	100.0%
	World	Count	9	61	70
		% within Area	12.9%	87.1%	100.0%
Total		Count	37	72	109
		% within Area	33.9%	66.1%	100.0%

Graph 5.5. % score for offering archives, digital collection/IR

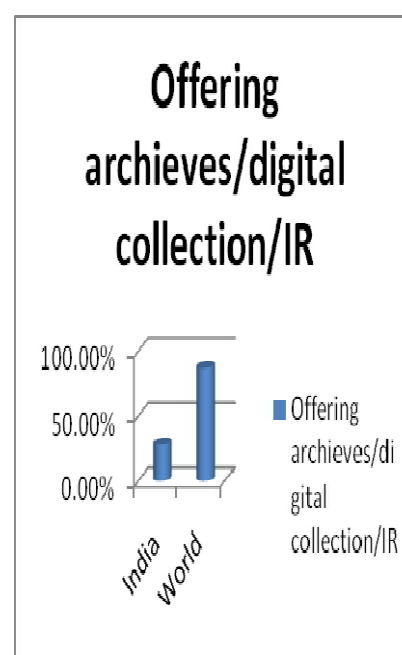


Table 5.12 of Chi-Square test shows χ^2 value is 38.801 and $p=.001$. There is a strong association between the access to archive or digital collection or IR provided by University libraries and Area wise i.e. World and India.

Table 5.12: Chi-Square Tests for archives or digital collection or IR

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	38.801 ^a	1	.001		
Continuity Correction ^b	36.217	1	.000		
Likelihood Ratio	39.553	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.1.6. Access to Visual Databases:

Below Table 5.13 shows that from the different parts of the world, 50% University libraries provide access to visual database and whereas not a single Indian University library provides access to visual databases.

Table 5.13: % (count) of library websites providing Access to visual databases

			Visual Databases		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	35	35	70
		% within Area	50.0%	50.0%	100.0%
Total		Count	74	35	109
		% within Area	67.9%	32.1%	100.0%

Graph 5.6. % score for providing access to visual databases

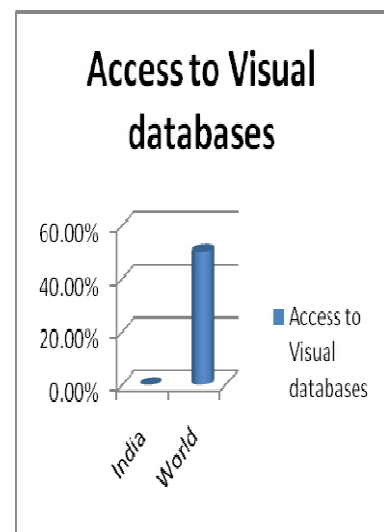


Table 5.14 shows Pearson Chi-Square value is 28.723, $p = .001$ which is statistically significant at 0.05 significance level for the access to visual databases provided by World University libraries and Indian University libraries.

Table 5.14: Chi-Square Tests for Access to visual databases

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28.723 ^a	1	.000		
Continuity Correction ^b	26.475	1	.000		
Likelihood Ratio	39.797	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5. 2.1.7. Find a Library Service:

Table 5.15 shows that from the different parts of the world, 85.7% and from India only 12.8% top selected University libraries provide find a library service where they can search and find networked libraries.

Table 5.15: % (count) of library websites providing find a library service

			Find a Library		Total
			No	Yes	
Area	India	Count	34	5	39
		% within Area	87.2%	12.8%	100.0%
	World	Count	10	60	70
		% within Area	14.3%	85.7%	100.0%
Total		Count	44	65	109
		% within Area	40.4%	59.6%	100.0%

Graph 5.7. % score for find a library service

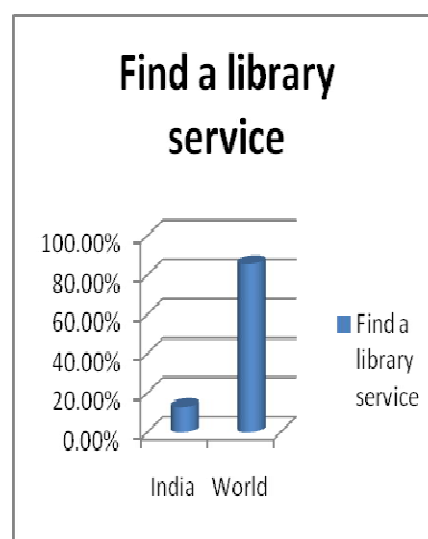


Table 5.16 Chi-Square test table shows Chi Square value (χ^2) = 55.285 and $p = .001$ there is a strong association between the find a library service provided by University libraries and Area wise i.e. World and India.

Table 5.16: Chi-Square Tests for find a library service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	55.285 ^a	1	.001		
Continuity Correction ^b	52.298	1	.000		
Likelihood Ratio	59.748	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

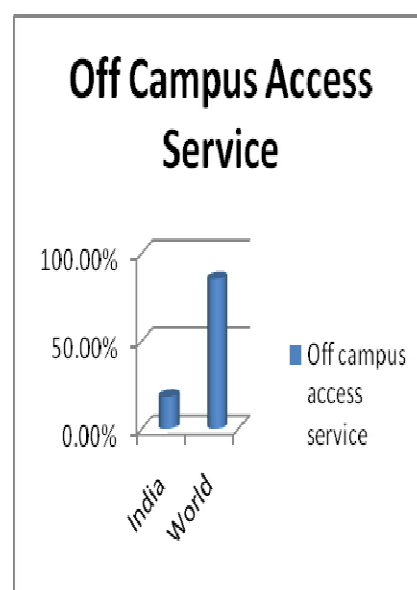
5.2.1.8. Off Campus Access:

Table 5.17 given below shows that 85.7% top ranked University libraries from different parts of the world provides off campus access to their patrons whereas 82.1% University libraries in India do not provide off campus access. Indian University libraries provide off campus access to very limited students and don't give information about off campus access on their website.

Table 5.17: % (count) of library websites providing off campus access

			Off campus access		Total
			No	Yes	
Area	India	Count	32	7	39
		% within Area	82.1%	17.9%	100.0%
	World	Count	10	60	70
		% within Area	14.3%	85.7%	100.0%
Total	Count	42	67	109	
	% within Area	38.5%	61.5%	100.0%	

Graph 5.8. % score for providing off campus access



The Chi-Square test for off campus access service provided by world and Indian University libraries given in the Table 5.18 shows $\chi^2 = 48.561$, $p = .001$ these values are statistically significant.

Table 5.18: Chi-Square Tests for off campus access service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	48.561 ^a	1	.001		
Continuity Correction ^b	45.742	1	.000		
Likelihood Ratio	51.197	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

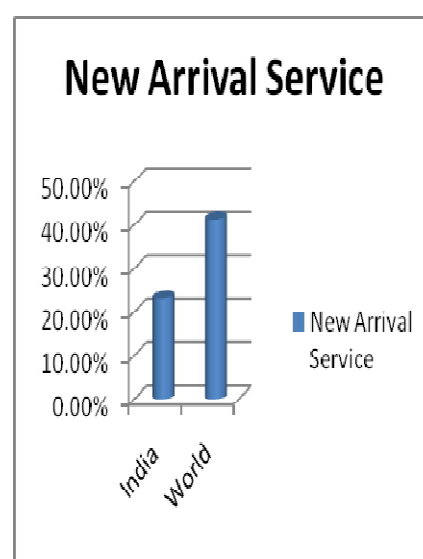
5.2.1.9. New Arrivals Service:

It is observed from below cross table that from different parts of the world 41.4 % and from India 23.1% University libraries provides information about new arrivals on their website.

Table 5.19: % (count) of library websites offering new arrival service

			New arrivals		Total
			No	Yes	
Area	India	Count	30	9	39
		% within Area	76.9%	23.1%	100.0%
	World	Count	41	29	70
		% within Area	58.6%	41.4%	100.0%
Total	Count	71	38	109	
	% within Area	65.1%	34.9%	100.0%	

Graph 5.9. % score for offering new arrival service



Chi-square tests in below table 5.20 shows the Pearson Chi-Square value is 3.714 and their continuity correction is 2.950 and likelihood ratio is 3.848 between World and Indian University libraries for this service. $p=.054$ which is statistically not significant at 0.05 level.

Table 5.20: Chi-Square Tests for new arrival service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.714 ^a	1	.054		
Continuity Correction ^b	2.950	1	.086		
Likelihood Ratio	3.848	1	.050		
Fisher's Exact Test				.062	.041
N of Valid Cases	109				

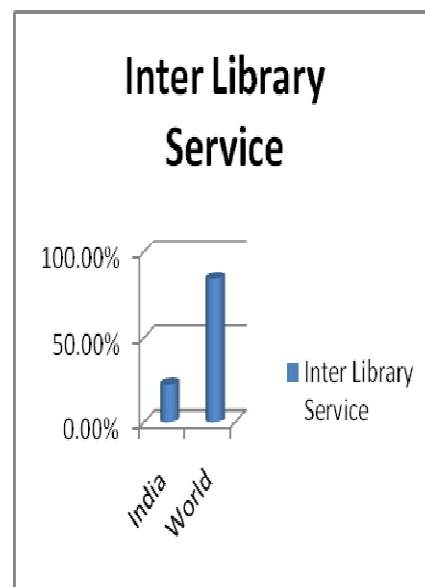
5.2.1.10. Inter Library Loan (ILL):

Table 5.21 shows that 23.1 Indian University libraries provide ILL service and 84.3% world University libraries from different parts provides ILL service to patrons.

Table 5.21: % (count) of library websites offering ILL service

			ILL		Total
			No	Yes	
Area	India	Count	30	9	39
		% within Area	76.9%	23.1%	100.0%
	World	Count	11	59	70
		% within Area	15.7%	84.3%	100.0%
Total		Count	41	68	109
		% within Area	37.6%	62.4%	100.0%

Graph 5.10. % score for offering ILL service



Below table 5.22 shows Pearson Chi-Square test results which show Pearson Chi-Square value of this service between World and India is 39.987 and $p=.001$ which is significant.

Table 5.22: Chi-Square Tests for ILL service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	39.987 ^a	1	.001		
Continuity Correction ^b	37.422	1	.000		
Likelihood Ratio	41.326	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

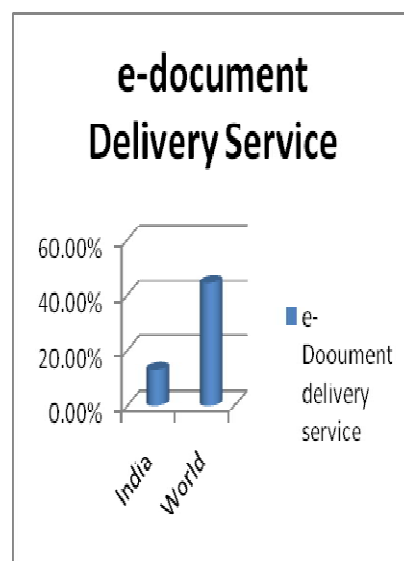
5.2.1.11. e-Document delivery:

The cross table for e-document delivery service below shows that along with ILL only 12.8% Indian University libraries and 44.3% University libraries of the world provide e-document delivery services to their patrons.

Table 5.23: % (count) of library websites offering e-document delivery service

			e-document Delivery		Total
			No	Yes	
Area	India	Count	34	5	39
		% within Area	87.2%	12.8%	100.0%
	World	Count	39	31	70
		% within Area	55.7%	44.3%	100.0%
Total	Count	73	36	109	
	% within Area	67.0%	33.0%	100.0%	

Graph 5.11. % score for offering e-document delivery service



After applying Chi-Square test for this service it is observed that Pearson Chi-Square value is 11.210 between World and Indian University Library e-document delivery service where $p=.001$ which shows significant results.

Table 5.24: Chi-Square Tests for e-document delivery service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.210 ^a	1	.001		
Continuity Correction ^b	9.833	1	.002		
Likelihood Ratio	12.298	1	.000		
Fisher's Exact Test				.001	.001
N of Valid Cases	109				

5.2.1.12. Book Recommendations:

It is found that 50% University libraries from different parts of the world offers service to recommend books online in India 92.3% University libraries don't provide this service for their readers.

Table 5.25: % (count) of library websites offering online book recommendation service

			Book Recommendation		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	35	35	70
		% within Area	50.0%	50.0%	100.0%
Total		Count	71	38	109
		% within Area	65.1%	34.9%	100.0%

Graph 5.12. % score for offering online book recommendation service

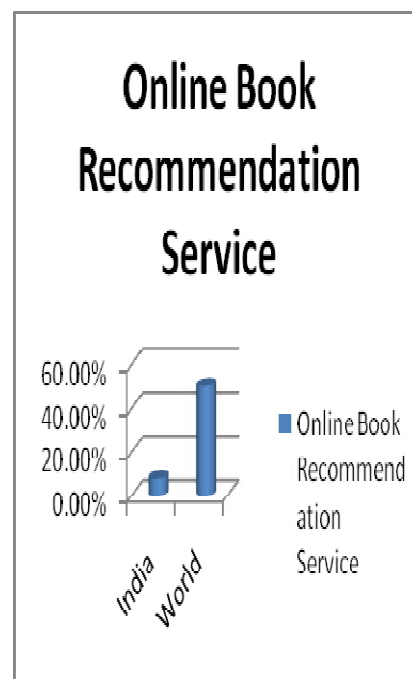


Table 5.26 Chi-Square test table shows $\chi^2 = 19.742$, Continuity correction value is 17.923, $p = .001$. which indicates a strong association between the book recommendation service provided by the world and Indian University libraries.

Table 5.26: Chi-Square Tests for book recommendation service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.742 ^a	1	.001		
Continuity Correction ^b	17.923	1	.000		
Likelihood Ratio	22.763	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.1. 13. DATA ANALYSIS OF TOTAL WEB-BASED BIBLIOGRAPHICAL SERVICES:

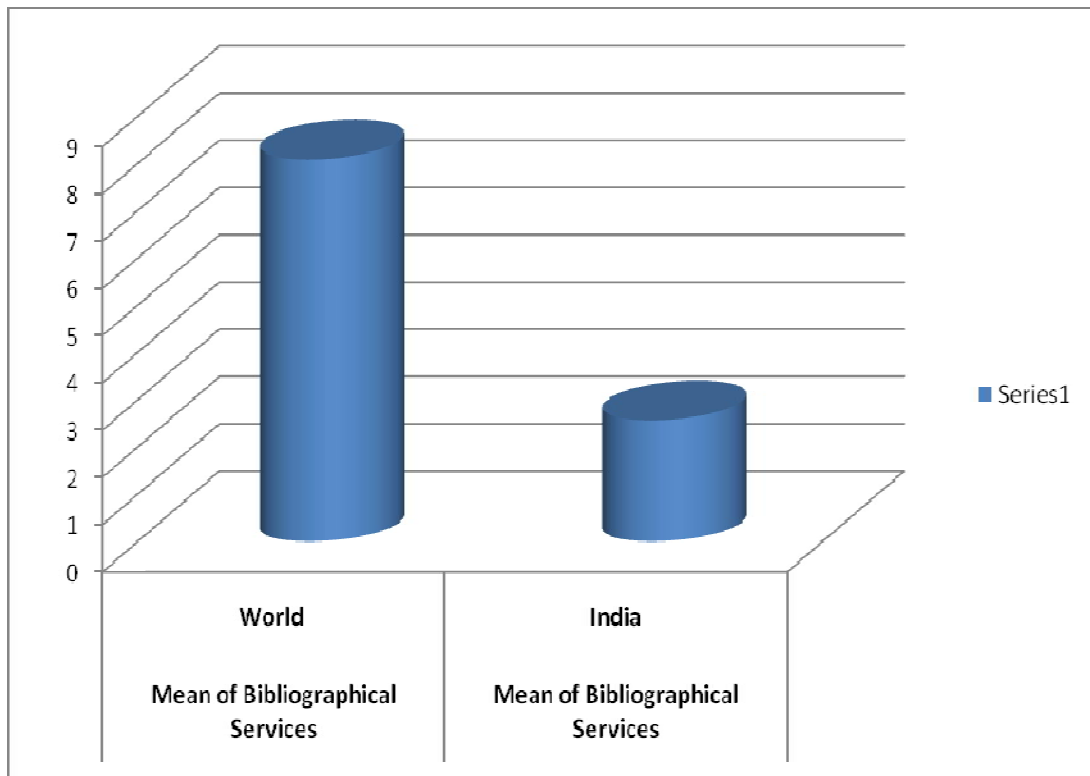
T-Tests for web-based bibliographical services:

Total 12 bibliographical services are considered for this study. There are 70 world University libraries are offering total bibliographical services which are having mean of 8.086 (± 2.4539) and that for 39 Indian University libraries, the mean score was 2.564 (± 2.8358) given in Table 5.27. Total bibliographical services were 12.

Table 5.27: Group Statistics for total bibliographical services area wise

	Area_Wise	N	Mean	Std. Deviation	Std. Error Mean
Total Bibliographical services	World	70	8.086	2.4539	.2933
	India	39	2.564	2.8358	.4541

Graph 5.13 Group statistics for mean of total bibliographical services



The mean difference between the mean score of web-based bibliographical services offered by Indian and World University libraries was 5.5216. This mean difference was statistically significant at 0.05 significant levels ($t=10.645$, $df=107$). This indicates that world University libraries are offering total bibliographical services better than Indian university libraries.

Here 'Mean' is average of web-based bibliographical services offered by total sample University libraries in the 'world' and 'India', calculated by dividing the total no of libraries by the number of bibliographical services offered by them.

Table 5.28 : Independent Samples Test for total Bibliographical services

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Total Bibliographical services	Equal variances assumed	1.454	.231	10.645	107	.001	5.5216	.5187
	Equal variances not assumed			10.214	69.644	.000	5.5216	.5406

5.2.2. DATA ANALYSIS OF WEB-BASED PATRON EDUCATION TOOLS:

In this category investigator clustered total 27 web-based patron education tools and the data analysis was done as below.

5.2.2.1. News:

Table 5.29 shows that total 87.1% (67/70) world University libraries, displays news of library on their website to update their patrons while only 6% (6/39) Indian University libraries offer this service.

Table 5.29: % (count) of libraries offering current news service on their website

			News		Total
			No	Yes	
Area	India	Count	33	6	39
		% within Area	84.6%	15.4%	100.0%
	World	Count	9	61	70
		% within Area	12.9%	87.1%	100.0%
Total		Count	42	67	109
		% within Area	38.5%	61.5%	100.0%

Graph 5.14. % score for offering current awareness service

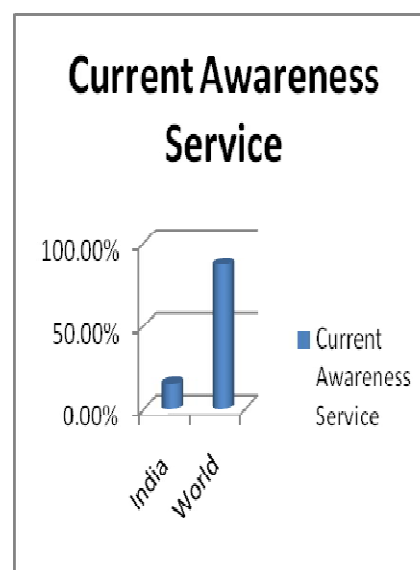


Table 5.30 shows $\chi^2 = 54.451$, $p = .001$ which indicates that the proportion of providing news service offered by top world and Indian University libraries on their website was statistically different from each other.

Table 5.30: Chi-Square Test for News

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	54.451 ^a	1	.001		
Continuity Correction ^b	51.464	1	.000		
Likelihood Ratio	58.121	1			
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.2. Upcoming Events:

Table 5.31 shows the difference between world and Indian University libraries, publishing their upcoming events on their website. It is observed that 75.7% world University libraries offer this service and only 7.7% Indian University libraries offer this service.

Table 5.31: % (count) of library websites offering upcoming events service

			Upcoming Events		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	17	53	70
		% within Area	24.3%	75.7%	100.0%
Total		Count	53	56	109
		% within Area	48.6%	51.4%	100.0%

Graph 5.15. % score for offering upcoming events service

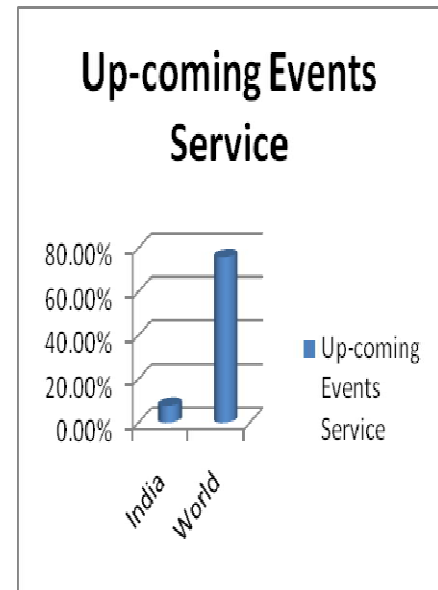


Table 5.32 shows a strong association between the upcoming events service and Area wise i.e. world and Indian University libraries, $\chi^2 = 46.390$, $p = .001$ is at statistically significant level.

Table 5.32: Chi-Square Tests for upcoming events

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	46.390a	1	.001		
Continuity Correction ^b	43.707	1	.000		
Likelihood Ratio	52.262	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.3. Weblog:

Table 5.33 shows that total 44.3% world University libraries have blogs along with their website and on the contrary, only 7.7% Indian University libraries have blogs.

Table 5.33: % (count) of libraries having their weblog

			Weblog		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	39	31	70
		% within Area	55.7%	44.3%	100.0%
Total	Count	75	34	109	
	% within Area	68.8%	31.2%	100.0%	

Graph 5.16. % score for having weblog

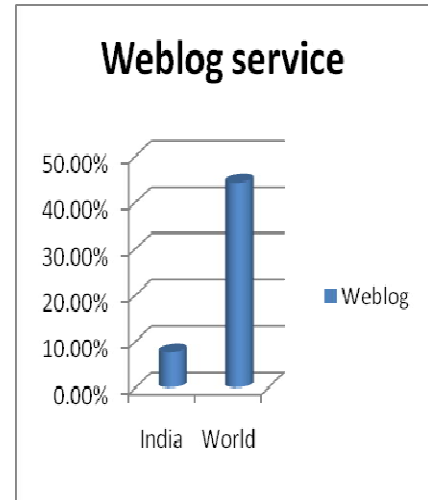


Table 5.34 shows Pearson Chi-Square value is 15.626, $p = .001$ which indicates strong association between the library weblogs and Area wise i.e. world and Indian University libraries.

Table 5.34: Chi-Square Tests for library weblog

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.626 ^a	1	.001		
Continuity Correction ^b	13.968	1	.000		
Likelihood Ratio	18.021	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.4. WordPress:

Table 5.35 shows the difference between the use of the WordPress publishing platform in the world and Indian University libraries. It is observed that 21.4% world University libraries use this platform, whereas not a single Indian University libraries use this publishing platform.

Table 5.35: % (count) of library websites using WordPress platform

			WordPress		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	55	15	70
		% within Area	78.6%	21.4%	100.0%
Total	Count	94	15	109	
	% within Area	86.2%	13.8%	100.0%	

Graph 5.17. % score for using WordPress platform

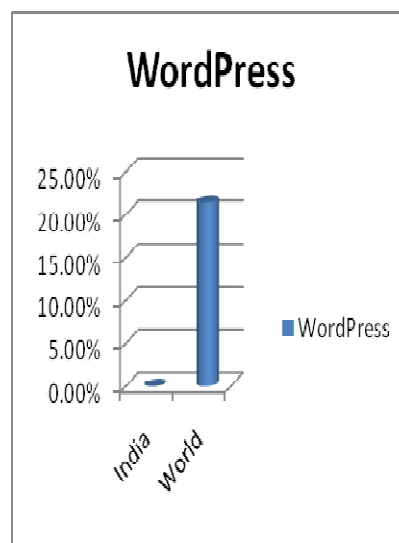


Table 5.36 shows the value of Pearson Chi-Square (χ^2) = 9.691 and $p = .002$. This indicates that the proportion of using the WordPress publishing platform by top world and Indian University libraries was statistically significant at 0.05 significance levels.

Table 5.36: Chi-Square Tests for WordPress

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.691 ^a	1	.002		
Continuity Correction ^b	7.969	1	.005		
Likelihood Ratio	14.592	1	.000		
Fisher's Exact Test				.001	.001
N of Valid Cases	109				

5.2.2.5. Instant chats / messaging:

Table 5.37 shows that the instant chats/ messaging service is offered by only 35.7% world University libraries and 7.7% Indian University libraries to guide their patrons.

Table 5.37: % (count) of library websites offering Instant chat/messaging service

			Instant chats/ messaging		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	45	25	70
		% within Area	64.3%	35.7%	100.0%
Total		Count	81	28	109
		% within Area	74.3%	25.7%	100.0%

Graph 5.18. % score for offering Instant Chat/messaging service

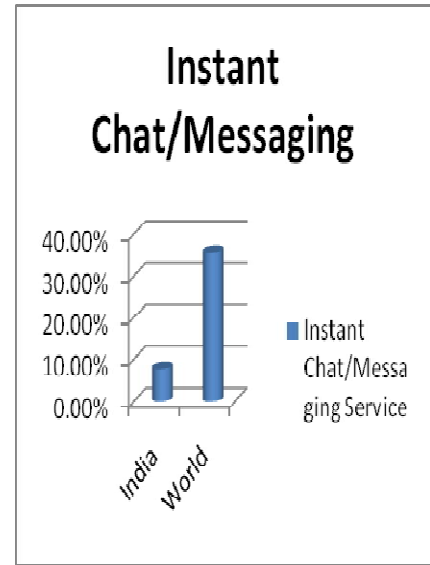


Table 5.38 shows strong association between the Instant chats/ messaging service and Area wise i.e. world and Indian University libraries, $\chi^2 = 10.303$, $p = .001$.

Table 5.38: Chi-Square Tests for instant chats/messaging service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.303 ^a	1	.001		
Continuity Correction ^b	8.887	1	.003		
Likelihood Ratio	11.811	1	.001		
Fisher's Exact Test				.001	.001
N of Valid Cases	109				

5.2.2.6. Ask us:

Table 5.39 shows the difference between world and Indian University libraries for their ask us service. It is observed that 95.7% (67/70) world University libraries

offers this service and 28.2% (11/9) Indian University libraries offer this service to solve patron's problems.

Table 5.39: % (count) of library websites offering ask us service

			Ask Us		Total
			No	Yes	
Area	India	Count	28	11	39
		% within Area	71.8%	28.2%	100.0%
	World	Count	3	67	70
		% within Area	4.3%	95.7%	100.0%
Total		Count	31	78	109
		% within Area	28.4%	71.6%	100.0%

Graph 5. 19. % score for ask us service

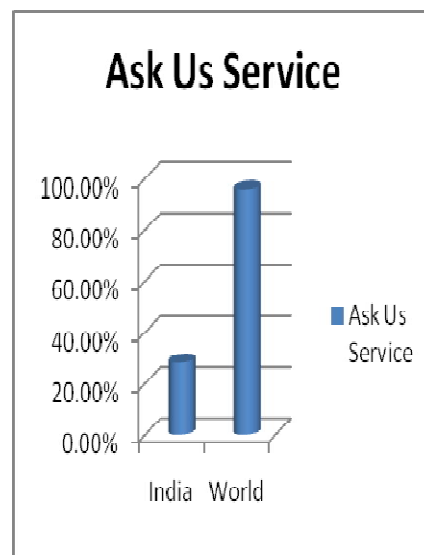


Table 5.40 shows a strong association between ask us service and area wise i.e. world and Indian University libraries, $\chi^2 = 56.086$, $p = .001$. This indicates that the proportion is significant.

Table 5.40: Chi-Square Tests for ask us service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	56.086 ^a	1	.001		
Continuity Correction ^b	52.818	1	.000		
Likelihood Ratio	58.991	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.7. Research /Subject guides:

Table 5.41 shows the difference between world and Indian University libraries providing research guides or subject guides. It is observed that 70% world University

libraries offer this service and only 12.8% Indian University Libraries offer this service to support research.

Table 5.41: % (count) of library websites offering research or subject guide service

			Research/Subject Guides		Total
			No	Yes	
Area	India	Count	34	5	39
		% within Area	87.2%	12.8%	100.0%
	World	Count	21	49	70
		% within Area	30.0%	70.0%	100.0%
Total	Count	55	54	109	
	% within Area	50.5%	49.5%	100.0%	

Graph 5.20. % score for research/subject guide service

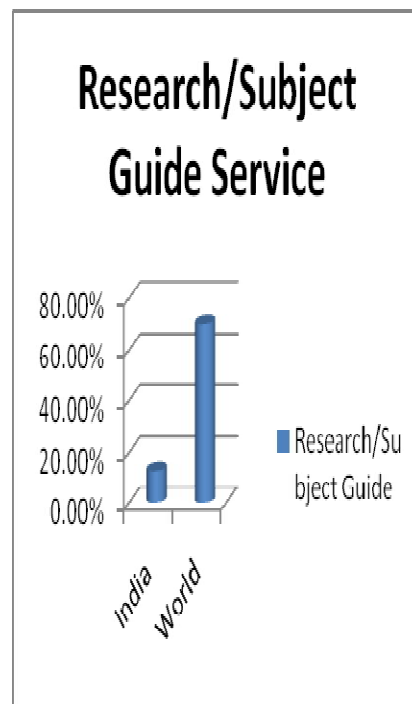


Table 5.42 shows $p = .001$ indicates that the proportion of providing subject guides by top world and Indian University libraries was statistically different from each other.

Table 5.42: Chi-Square Tests for Research/Subject Guide service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	32.758 ^a	1	.001		
Continuity Correction ^b	30.510	1	.000		
Likelihood Ratio	35.705	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.8. Video tutorials:

Table 5.43 shows that 55.7% world University libraries use video tutorials to educate their patrons and in India only 7.7% Indian University libraries use this tool for patron education.

Table 5.43: % (count) of library websites providing video tutorial service

			Video Tutorials		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	31	39	70
		% within Area	44.3%	55.7%	100.0%
Total		Count	67	42	109
		% within Area	61.5%	38.5%	100.0%

Graph 5.21. % score for video tutorial service

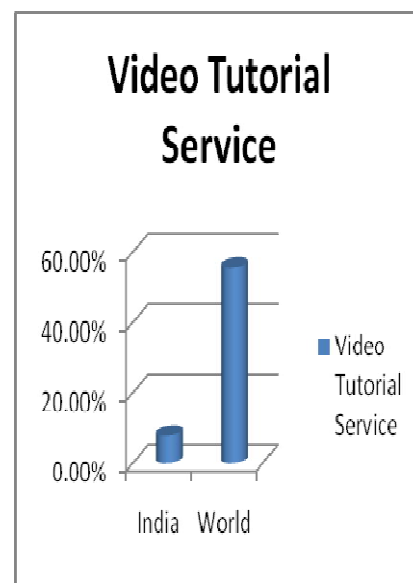


Table 5.44 shows strong association between education through video tutorials and Area wise i.e. world and Indian University libraries, $\chi^2 = 24.386$, $p = .001$. This indicates that the proportion was statistically different from each other.

Table 5.44. Chi-Square Tests for video tutorial tools

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	24.386 ^a	1	.001		
Continuity Correction ^b	22.401	1	.000		
Likelihood Ratio	28.044	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.9. FAQs:

Table 5.45 shows the difference between world and Indian University libraries providing FAQ to give ready answers to patron's question. It is observed that 68.6% world University libraries and only 12.8% Indian University libraries offer this service.

Table 5.45: % (count) of library websites offering FAQ service

			FAQs		Total
			No	Yes	
Area	India	Count	34	5	39
		% within Area	87.2%	12.8%	100.0%
	World	Count	22	48	70
		% within Area	31.4%	68.6%	100.0%
Total		Count	56	53	109
		% within Area	51.4%	48.6%	100.0%

Graph 5.22. % score for FAQ service

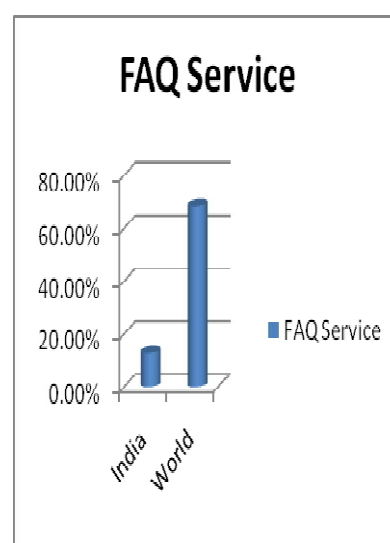


Table 5.46 shows strong association between the FAQs service and Area wise i.e. world and Indian University libraries, $\chi^2 = 31.162$, $p = .001$. This indicates that the proportion of FAQ service by top world and Indian University libraries was statistically different from each other.

Table 5.46: Chi-Square Tests for FAQ service

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	31.162 ^a	1	.001		
Continuity Correction ^b	28.971	1	.000		
Likelihood Ratio	34.004	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.10. YouTube:

Table 5.47 shows the difference between world and Indian University libraries using You Tube for patron education. It is observed that 70% world University libraries and only 7.7% Indian University libraries uses YouTube platform to publish videos.

Table 5.47: % (count) of library websites use You Tube platform

			YouTube		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	21	49	70
		% within Area	30.0%	70.0%	100.0%
Total	Count	57	52	109	
	% within Area	52.3%	47.7%	100.0%	

Graph 5.23. % score for use of YouTube platform

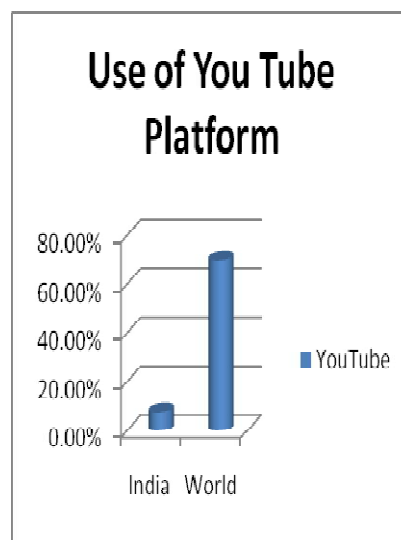


Table 5.48 shows a strong association between the use of YouTube platform and Area wise i.e. world and Indian University libraries, $\chi^2 = 38.976$, $p = .001$.

Table 5.48: Chi-Square Tests for You Tube platform

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	38.976 ^a	1	.001		
Continuity Correction ^b	36.518	1	.000		
Likelihood Ratio	44.203	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.11. Service directory

Table 5.49 shows that 75.7% world University libraries and only 7.7% Indian University libraries gives access to the service directory means the staff directory so that patrons can communicate with concern staff members.

Table 5.49: % (count) of libraries providing service directory on their website

			Service Directory		Total
			No	Yes	
Area	India	Count	23	16	39
		% within Area	59.0%	41.0%	100.0%
	World	Count	17	53	70
		% within Area	24.3%	75.7%	100.0%
Total	Count	40	69	109	
	% within Area	36.7%	63.3%	100.0%	

Graph 5.24. % score for providing service directory

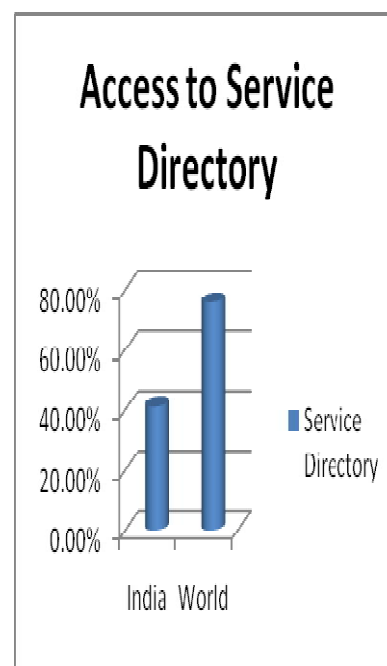


Table 5.50 Indicates that the proportion of providing service directory by top world and Indian University libraries was statistically different from each other and therefore significant. Pearson Chi-Square value is 12.973 and p=.001

Table 5.50: Chi-Square Tests for Service Directory

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.973 ^a	1	.001		
Continuity Correction ^b	11.523	1	.001		
Likelihood Ratio	12.885	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.12. PPTs / PDFs:

Table 5.51 shows the difference between world and Indian University libraries using PDF and PPTs for giving instructions and presentations. It is observed that 84.3% world University libraries offer this service and 33.3% Indian University libraries uses these tools

Table 5.51: % (count) of library websites using PPTs/PDFs for patron education

			PPTs/PDFs		Total
			No	Yes	
Area	India	Count	26	13	39
		% within Area	66.7%	33.3%	100.0%
	World	Count	11	59	70
		% within Area	15.7%	84.3%	100.0%
Total		Count	37	72	109
		% within Area	33.9%	66.1%	100.0%

Graph 5.25. % score for the use of PPTs/PDFs

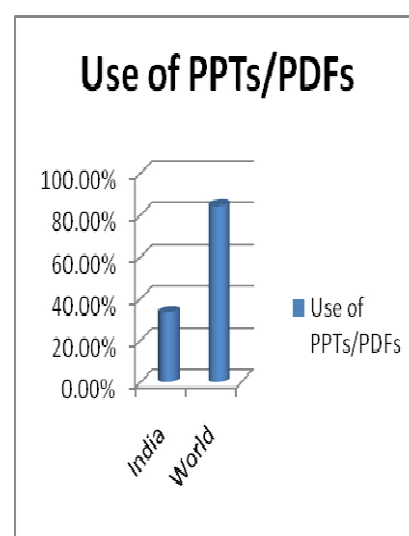


Table 5.52 shows a strong association between the use of PPTs and PDFs with the world and Indian university libraries, $\chi^2 = 28.999$, $p = .001$. This indicates that the proportion of usage of PPTs and PDFs by top world and Indian University libraries was statistically different from each other.

Table 5.52: Chi-Square Tests for usage of PPTs/PDFs

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28.999 ^a	1	.001		
Continuity Correction ^b	26.771	1	.000		
Likelihood Ratio	29.132	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.13. Research Tutorials:

Table 5.53 shows the difference between world and Indian University libraries for providing research tutorials. It is observed that 58.6% (41/70) world University libraries and only 7.7% (3/39) Indian University libraries provide research tutorials for their patrons.

Table 5.53: % (count) of libraries use research tutorials for patron education

			Research Tutorials		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	29	41	70
		% within Area	41.4%	58.6%	100.0%
Total	Count	65	44	109	
	% within Area	59.6%	40.4%	100.0%	

Graph 5.26. % score for the use of research tutorials

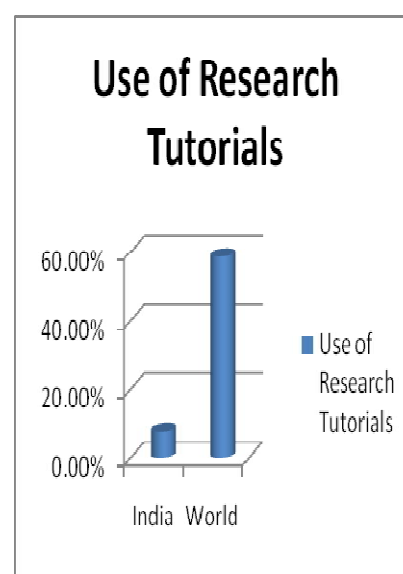


Table 5.54 shows that the proportion of providing research tutorials by top world and Indian University libraries was statistically different from each other. $p=.001$, Pearson Chi Square=26.934.

Table 5.54: Chi-Square Tests for Research Tutorials

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.934 ^a	1	.001		
Continuity Correction ^b	24.862	1	.000		
Likelihood Ratio	30.909	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.14: Tips for access and use:

Table 5.55 indicates 97.1% world University libraries and only 30.8% Indian University libraries give tips for access and use of library on their website.

Table 5.55: % (count) of library websites provides tips for access and use of the library

			Tips for access and use		Total
			No	Yes	
Area	India	Count	27	12	39
		% within Area	69.2%	30.8%	100.0%
	World	Count	2	68	70
		% within Area	2.9%	97.1%	100.0%
Total	Count	29	80	109	
	% within Area	26.6%	73.4%	100.0%	

Graph 5.27. % score for providing tips for access and use of the library

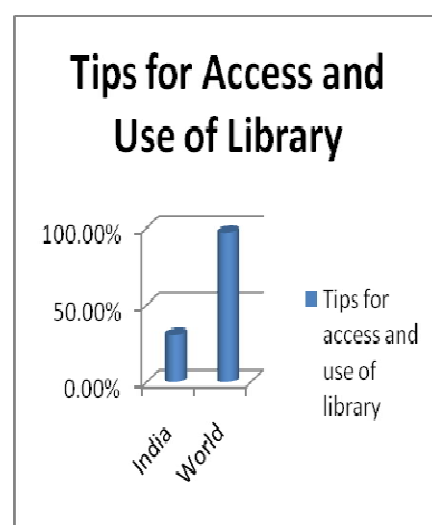


Table 5.56 shows a strong association between this service and Area wise i.e. world and Indian University libraries, $\chi^2 = 56.506$, $p = .001$.

Table 5.56: Chi-Square Tests for Tips for Access and Use

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	56.506 ^a	1	.001		
Continuity Correction ^b	53.158	1	.000		
Likelihood Ratio	59.978	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.15: e-Newsletter

Table 5.57 shows the difference between world and Indian University libraries, publishing their newsletter. It is observed that 42.9% world University libraries, publishing their newsletter while not a single Indian University libraries publish their newsletter or bulletin.

Table 5.57: % (count) of libraries publishing their newsletter

			Newsletter		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	40	30	70
		% within Area	57.1%	42.9%	100.0%
Total	Count	79	30	109	
	% within Area	72.5%	27.5%	100.0%	

Graph 5.28. % score for publishing newsletter

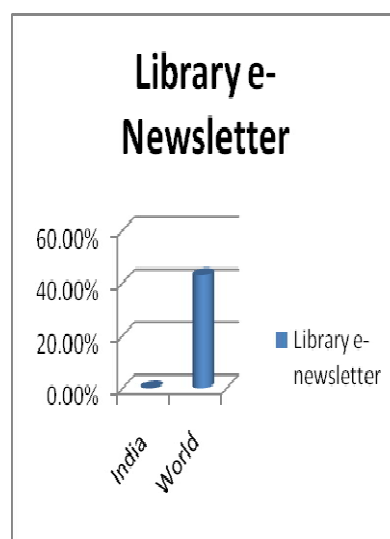


Table 5.58 shows a strong association between the library newsletter and area wise i.e. world and Indian University libraries, $\chi^2 = 23.061$, $p = .001$ and this indicates that the proportion was statistically different from each other.

Table 5.58: Chi-Square Tests for Newsletter

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23.061 ^a	1	.001		
Continuity Correction ^b	20.963	1	.000		
Likelihood Ratio	32.662	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.16. Help/ User guides:

Table 5.59 shows that total 92.9% (65/70) World University libraries and 17.9% Indian University libraries provide help guides for their users.

Table 5.59: % (count) of library websites publishing help/user Guides

			Help/ User guides		Total
			No	Yes	
Area	India	Count	32	7	39
		% within Area	82.1%	17.9%	100.0%
	World	Count	5	65	70
		% within Area	7.1%	92.9%	100.0%
Total	Count	37	72	109	
	% within Area	33.9%	66.1%	100.0%	

Graph 5.29. % score for publishing help/user guides

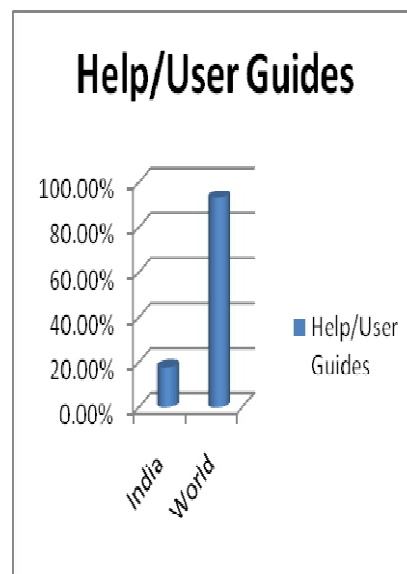


Table 5.60 shows a strong association between the Help/User Guides and Area wise i.e. world and Indian University libraries, $\chi^2 = 62.678$, $p = .001$.

Table 5.60: Chi-Square Tests for Help/User Guides

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	62.678 ^a	1	.001		
Continuity Correction ^b	59.382	1	.000		
Likelihood Ratio	66.933	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.17. RSS Feeds

It is observed that 57.1% World University libraries provide RSS feeds to their services and no libraries in India provides this and is shown in Table 5.61.

Table 5.61: % (count) of library websites offering RSS feeds

			RSS Feeds		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	30	40	70
		% within Area	42.9%	57.1%	100.0%
Total		Count	69	40	109
		% within Area	63.3%	36.7%	100.0%

Graph 5.30. % score for offering RSS feeds

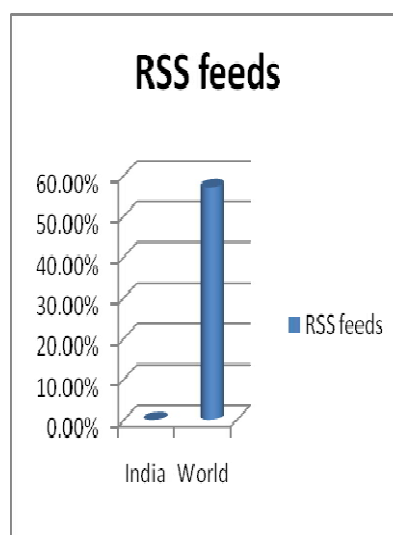


Table 5.62 indicates that the proportion of providing RSS feeds by top world and Indian University libraries were statistically different from each other and significant at 0.05 levels. $p=.001$.

Table 5.62: Chi-Square Tests for RSS feeds

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	35.205 ^a	1	.001		
Continuity Correction ^b	32.788	1	.000		
Likelihood Ratio	47.690	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

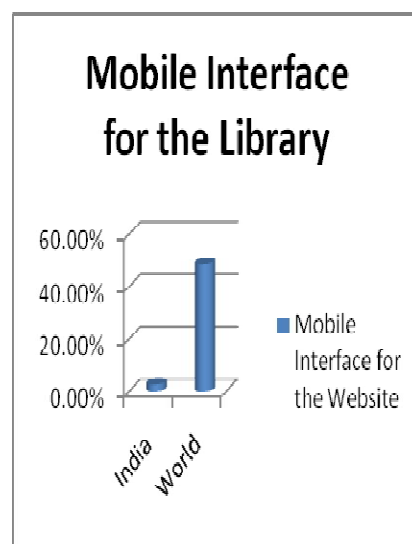
5.2.2.18. Mobile application:

Table 5.63 shows that 48.6% World University libraries and only 2.6% Indian University libraries provides mobile friendly access to their website.

Table 5.63: % (count) of mobile friendly library websites

			Mobile App		Total
			No	Yes	
Area	India	Count	38	1	39
		% within Area	97.4%	2.6%	100.0%
	World	Count	36	34	70
		% within Area	51.4%	48.6%	100.0%
Total		Count	74	35	109
		% within Area	67.9%	32.1%	100.0%

Graph 5.31. % score for mobile interface for the website



Pearson Chi-Square value of mobile applications in University libraries is 24.319, $p = .001$. Table 5.64 shows a strong association between the mobile application and Area wise i.e. world and Indian University libraries.

Table 5.64: Chi-Square Tests for mobile application

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	24.319 ^a	1	.000		
Continuity Correction ^b	22.254	1	.000		
Likelihood Ratio	30.553	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.19. Live Online Sessions:

Table 5.65 shows the difference between 'World' and Indian University libraries, giving live online sessions for patron education or orientation. It is observed that in both world and India level this service is very poor. Only 7.1% libraries from World gives live sessions and on India level 100% libraries don't provide these kinds of sessions.

Table 5.65: % (count) of library websites offering live online sessions

			Live Online Sessions		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	65	5	70
		% within Area	92.9%	7.1%	100.0%
Total	Count	104	5	109	
	% within Area	95.4%	4.6%	100.0%	

Graph 5.32. % score for offering live online sessions

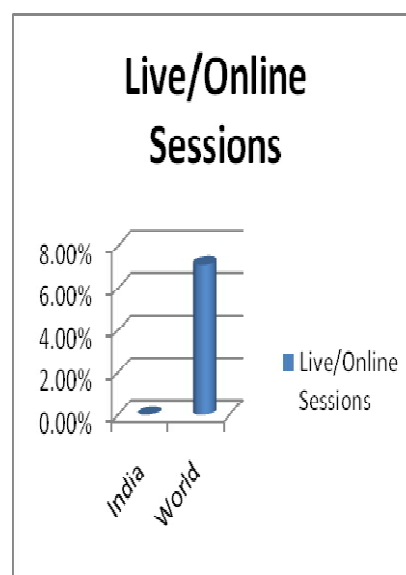


Table 5.66 shows Pearson Chi-Square value 2.920, $p = .088$ for giving live online sessions by world and Indian University libraries, which indicates that the proportion of providing online live sessions by top world and Indian University libraries was not significant at 0.05 significance level.

Table 5.66: Chi-Square Tests for live online sessions

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.920 ^a	1	.088		
Continuity Correction ^b	1.516	1	.218		
Likelihood Ratio	4.562	1	.033		
Fisher's Exact Test				.158	.104
N of Valid Cases	109				

5.2.2.20. Prezi PPT tool/ SlideShare:

Table 5.67 shows that total 41.4% world University libraries and 0% Indian University libraries use Prezi PPT tool or SlideShare platform to give their presentation to their patrons.

Table 5.67: % (count) of libraries educating their patrons using Prezi ppt tool/ Slideshare

			Prezi PPT tool/ slide share		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	41	29	70
		% within Area	58.6%	41.4%	100.0%
Total		Count	80	29	109
		% within Area	73.4%	26.6%	100.0%

Graph 5.33. % score for using Prezi/ SlideShare

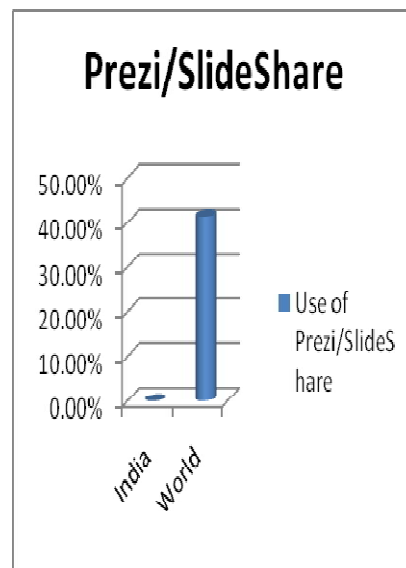


Table 5.68 indicates that the proportion of using Prezi, or SlideShare platform for presentation by top world and Indian University Libraries was statistically different from each other and significant. $P=.001$ and Pearson Chi-Square value is 22.014.

Table 5.68: Chi-Square Tests for Prezi PPT tool/ Slideshare

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	22.014 ^a	1	.001		
Continuity Correction ^b	19.944	1	.000		
Likelihood Ratio	31.313	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.21. Audio Tutorials

Table 5.69 shows the difference between ‘World’ and Indian University libraries using audio tutorials for educating their patrons. It is observed that only 15.7% world University libraries and not a single Indian University library prepare audio tutorials to educate their patron.

Table 5.69: % (count) of libraries using the audio tutorial to educate their patrons

			Audio Tutorials		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	59	11	70
		% within Area	84.3%	15.7%	100.0%
Total	Count	98	11	109	
	% within Area	89.9%	10.1%	100.0%	

Graph 5.34. % score for using audio tutorials

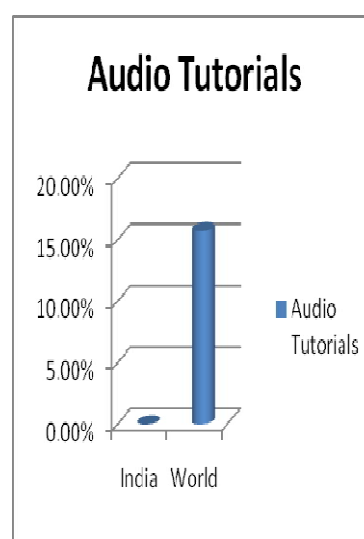


Table 5.70 shows Pearson Chi-Square value is 6.816, $p = .009$ there is a strong association between the use of audio tutorials and area wise i.e. the ‘World’ and Indian University Libraries.

Table 5.70: Chi-Square Tests for audio tutorials

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.816 ^a	1	.009		
Continuity Correction ^b	5.195	1	.023		
Likelihood Ratio	10.420	1	.001		
Fisher's Exact Test				.007	.006
N of Valid Cases	109				

5.2.2.22. Maps Directions

Table 5.71 shows that 58.6% World University libraries give maps direction for their patron's ease and 23.1% Indian University libraries gives this service.

Table 5.71: % (count) of library websites provides maps directions

			Maps_Directions		Total
			No	Yes	
Area	India	Count	30	9	39
		% within Area	76.9%	23.1%	100.0%
	World	Count	29	41	70
		% within Area	41.4%	58.6%	100.0%
Total	Count	59	50	109	
	% within Area	54.1%	45.9%	100.0%	

Graph 5.35. % score for providing map directions

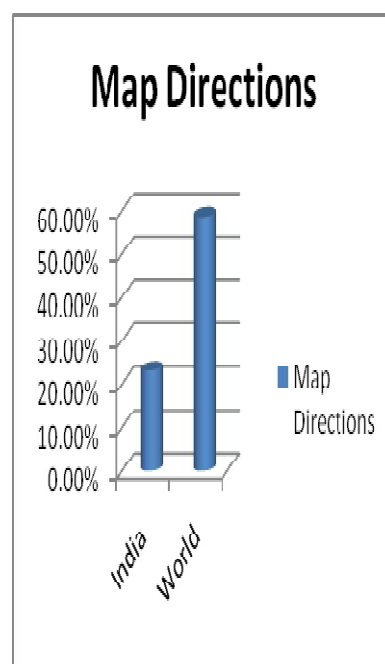


Table 5.72 shows a strong association between the map direction service and area wise i.e. world and Indian University Libraries, $\chi^2 = 12.708$, $p = .001$.

Table 5.72: Chi-Square Tests for map directions

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.708 ^a	1	.001		
Continuity Correction ^b	11.319	1	.001		
Likelihood Ratio	13.253	1	.000		
Fisher's Exact Test				.001	.000
N of Valid Cases	109				

5.2.2.23. Feedback:

Table 5.73 shows that 62.9% World University libraries offer this service and only 15.4% Indian University libraries, collect online feedback and suggestions from patrons for future improvement in services and facilities.

Table 5.73: % (count) of library websites collecting library Feedback

			Feedback		Total
			No	Yes	
Area	India	Count	33	6	39
		% within Area	84.6%	15.4%	100.0%
	World	Count	26	44	70
		% within Area	37.1%	62.9%	100.0%
Total	Count	59	50	109	
	% within Area	54.1%	45.9%	100.0%	

Graph 5.36. % score for online library feedback

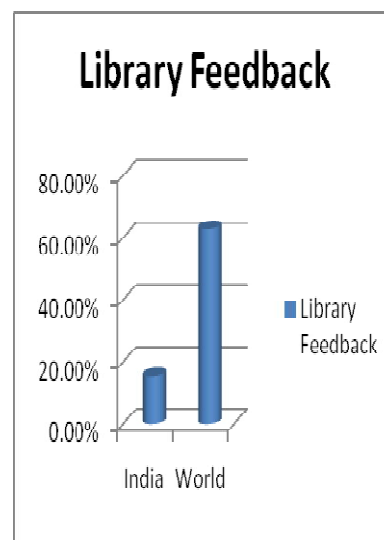


Table 5.74 shows a strong association between the Feedback service and Area wise i.e. world and Indian University libraries, $\chi^2 = 22.733$, $p = .001$ which indicates that the proportion of providing feedback service by top world and Indian University libraries was statistically different from each other.

Table 5.74: Chi-Square Tests for Feedback

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	22.733 ^a	1	.001		
Continuity Correction ^b	20.861	1	.000		
Likelihood Ratio	24.515	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.24. Live / Online Videos Library:

Table 5.75 shows the difference between world and the Indian University libraries, giving access of online or live video library. The table indicates that only 15.7% world University libraries gives access to live or online video collection.

Table 5.75: % (count) of library websites offering Live/Online video library

			Live/ Online Videos Library		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	59	11	70
		% within Area	84.3%	15.7%	100.0%
Total		Count	98	11	109
		% within Area	89.9%	10.1%	100.0%

Graph 5.37. % score for offering live/online video library

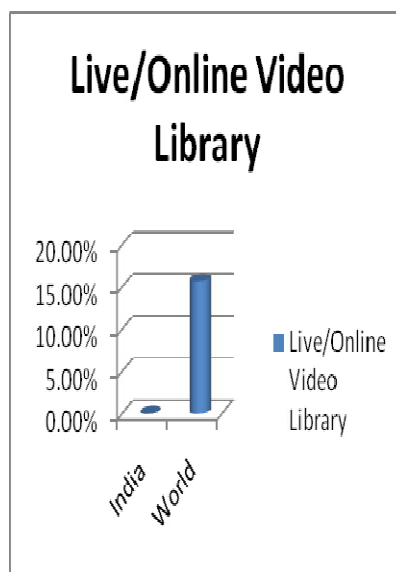


Table 5.76 shows a strong association between the live/online video library access and Area wise i.e. world and Indian University libraries, $\chi^2 = 6.816$, $p = .009$.

Table 5.76: Chi-Square Tests for Live/Online Video Library

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.816 ^a	1	.009		
Continuity Correction ^b	5.195	1	.023		
Likelihood Ratio	10.420	1	.001		
Fisher's Exact Test				.007	.006
N of Valid Cases	109				

5.2.2.25. Library Calendar:

Table 5.77 shows that 35.9% Indian University libraries and 87.1% World University libraries gives their activities and timings calendar on their website.

Table 5.77: % (count) of library websites publishing Library Calendar

			Library Calendar		Total
			No	Yes	
Area	India	Count	25	14	39
		% within Area	64.1%	35.9%	100.0%
	World	Count	9	61	70
		% within Area	12.9%	87.1%	100.0%
Total		Count	34	75	109
		% within Area	31.2%	68.8%	100.0%

Graph 5.38. % score for publishing library calendar

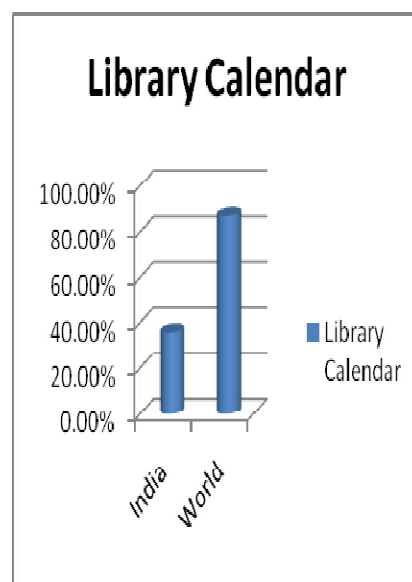


Table 5.78 shows a strong association between the library calendar service and area wise i.e. the world and Indian University libraries, $\chi^2 = 30.645$, $p = .001$ which shows a significant proportion at the significant level 0.05.

Table 5.78: Chi-Square Tests for library calendar

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	30.645 ^a	1	.001		
Continuity Correction ^b	28.304	1	.000		
Likelihood Ratio	30.665	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.26. Photo Gallery:

Table 5.79 shows the difference between World and Indian University libraries, publishing their photo gallery on their website for public information. It is observed that 60% World University libraries and only 46.2% Indian University libraries made available their photo gallery for patrons.

Table 5.79: % (count) of library websites having a column of photo gallery

			Photo gallery		Total
			No	Yes	
Area	India	Count	21	18	39
		% within Area	53.8%	46.2%	100.0%
	World	Count	28	42	70
		% within Area	40.0%	60.0%	100.0%
Total	Count	49	60	109	
	% within Area	45.0%	55.0%	100.0%	

Graph 5.39. % score for having photo gallery

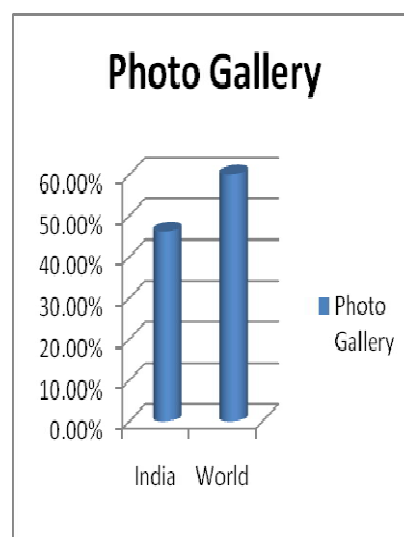


Table 5.80 indicates that the proportion of providing access to the photo gallery by top World and Indian University libraries was statistically different from each other. $\chi^2 = 1.940$, $p = .164$ shows the difference was statistically not significant at 0.05 significance level.

Table 5.80: Chi-Square Tests for photo gallery

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.940 ^a	1	.164		
Continuity Correction ^b	1.421	1	.233		
Likelihood Ratio	1.938	1	.164		
Fisher's Exact Test				.228	.117
N of Valid Cases	109				

5.2.2.27. Text Instruction

Table 5.81 shows that total 92.9% World University libraries and only 61.9% Indian University libraries educate or instruct patrons using text instructions on the web pages.

Table 5.81: % (count) of libraries educating patrons with text instruction on their websites

			Text Instruction		Total
			No	Yes	
Area	India	Count	15	24	39
		% within Area	38.5%	61.5%	100.0%
	World	Count	5	65	70
		% within Area	7.1%	92.9%	100.0%
Total		Count	20	89	109
		% within Area	18.3%	81.7%	100.0%

Graph 5.40. % score for publishing text instructions

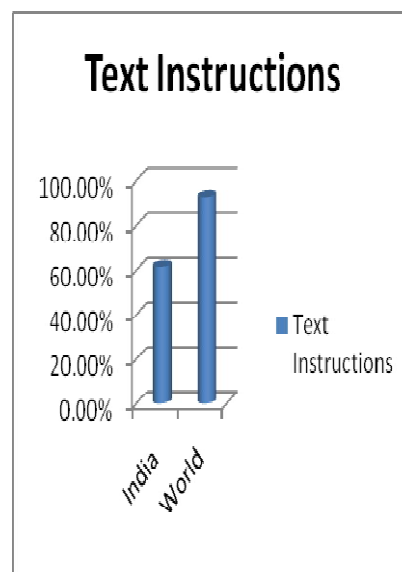


Table 5.82 shows a strong association between the Text Instructions and Area wise i.e. World and Indian University libraries, $\chi^2 = 16.397$, $p = .001$. This indicates that the proportion of this service with top World and Indian University libraries was statistically different from each other and therefore significant.

Table 5.82: Chi-Square Tests for Text Instructions

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	16.397 ^a	1	.001		
Continuity Correction ^b	14.374	1	.000		
Likelihood Ratio	15.913	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.2.28. DATA ANALYSIS OF TOTAL WEB-BASED PATRON EDUCATION SERVICES/TOOLS:

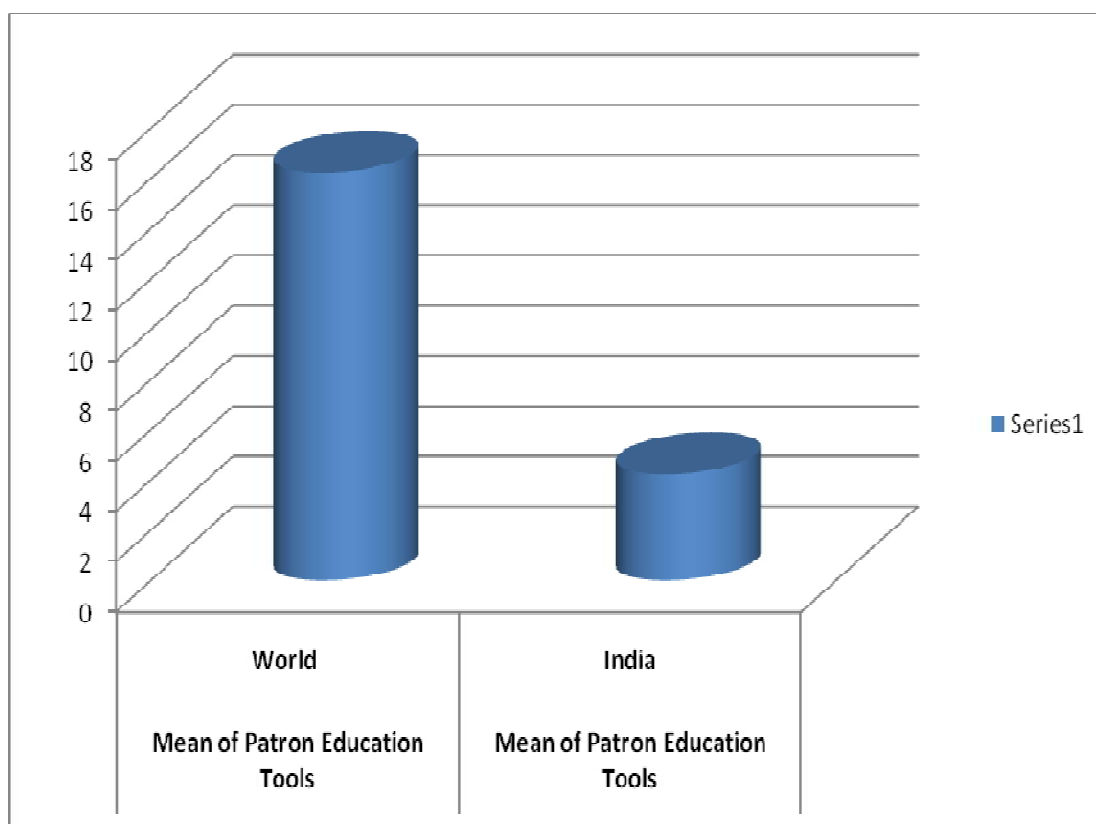
T-Tests for web-based patron education tools/services:

Total 27 patron education services and tools are studied here. There are 70 World University libraries are offering a total web-based patron education services which are having mean of 16.229 (± 5.7513) and that for 39 Indian University libraries, the mean score was 4.231 (± 4.1133) given in Table 5.83. Total patron education tools studied were 27.

Table 5.83: Group Statistics for total patron education services

	Area_Wise	N	Mean	Std. Deviation	Std. Error Mean
Total Patron education services	World	70	16.229	5.7513	.6874
	India	39	4.231	4.1133	.6587

Graph 5.41: Group statistics of mean of total patron education services



The mean difference between the mean score of web-based patron education services offered by Indian and World University libraries was 11.9978. This mean difference was statistically significant at 0.05 significance level ($t = 11.484$, $df = 107$) shown in Table 5.84. This indicates that world University libraries are offering total patron education services much better than Indian University libraries.

Table 5.84: Independent Samples Test for patron education tools

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Total Patron education tools	Equal variances assumed	6.477	.012	11.484	107	.001	11.9978	1.0448
	Equal variances not assumed			12.602	100.319	.000	11.9978	.9520

5.2.3. DATA ANALYSIS OF WEB-BASED PATRON COMMUNICATION

TOOLS:

In this investigator clustered total 14 patron communication tools. The data analysis of these tools used by 109 universities in India and World is given below.

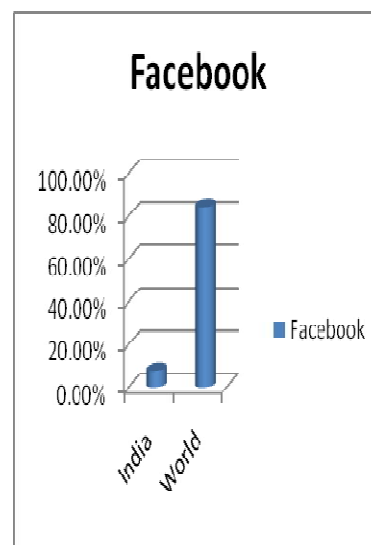
5.2.3.1. Facebook:

From Table 5.85 it is observed that 64 / 70 means 84.3% University libraries of the world and 5/39 means 12.8% Indian University libraries uses the Facebook social networking site as one of communication mediums.

Table 5.85: % (count) of libraries using Facebook for patron communication

			Facebook		Total
			No	Yes	
Area	India	Count	34	5	39
		% within Area	87.2%	12.8%	100.0%
	World	Count	11	59	70
		% within Area	15.7%	84.3%	100.0%
Total		Count	45	64	109
		% within Area	41.3%	58.7%	100.0%

Graph 5.42. % score for using Facebook



After applying Chi-Square tests to the data collected it shows significant Pearson Chi-Square value (χ^2) = 52.770, $p = .001$ at 0.05 significance level.

Table 5.86: Chi-Square Tests for Facebook

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	52.770 ^a	1	.001		
Continuity Correction ^b	49.863	1	.000		
Likelihood Ratio	57.020	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

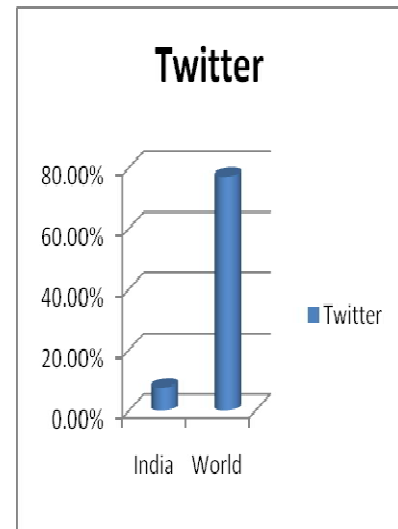
5.2.3.1. Twitter:

From Table 5.87 it is observed that 54/70 means 77.1% University libraries of the world and 3/39 means 7.7% Indian University libraries uses Twitter- social network site as one of communication mediums.

Table 5.87: % (count) of libraries using Twitter for patron communication

			Twitter		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	16	54	70
		% within Area	22.9%	77.1%	100.0%
Total		Count	52	57	109
		% within Area	47.7%	52.3%	100.0%

Graph 5.43. % score for using Twitter



Chi-Square tests show that there was a strong association between use of Twitter by the world and Indian University Libraries. Table 5.88 shows Pearson Chi-Square value (χ^2) = 48.424, $p = .001$ which is significant at 0.05 significance level.

Table 5.88: Chi-Square Tests for Twitter

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	48.424 ^a	1	.001		
Continuity Correction ^b	45.680	1	.000		
Likelihood Ratio	54.468	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

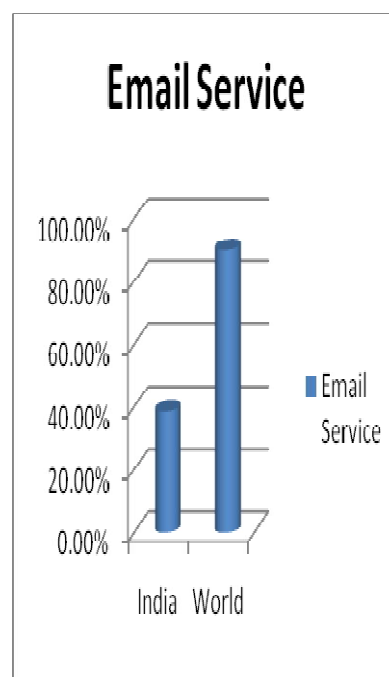
5.2.3.3. Email:

Table 5.89 shows that 63/70 means 90% University libraries of the World and 15/39 means 15% Indian University libraries uses Email as one of the communication tools.

Table 5.89: % (count) of libraries using email to communicate with patrons

			Email		Total
			No	Yes	
Area	India	Count	24	15	39
		% within Area	61.5%	38.5%	100.0%
	World	Count	7	63	70
		% within Area	10.0%	90.0%	100.0%
Total	Count	31	78	109	
	% within Area	28.4%	71.6%	100.0%	

Graph 5.44. % score for using Email



Chi-Square tests show that there was a strong association between use of Email as a communication tool by the World and Indian University libraries. Table 5.90 shows Pearson Chi-Square value (χ^2) =32.689, and significant $p = .001$

Table 5.90: Chi-Square Tests for Email

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	32.689 ^a	1	.001		
Continuity Correction ^b	30.205	1	.000		
Likelihood Ratio	32.679	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

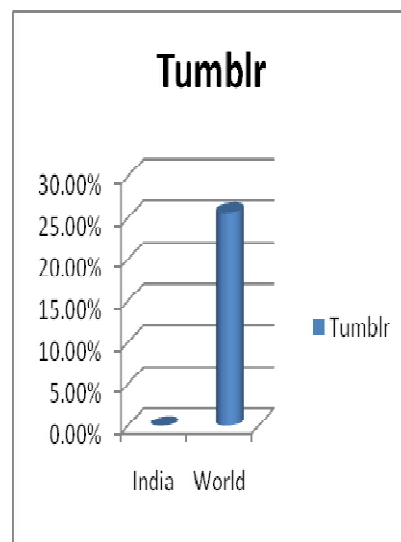
5.2.3.4. Tumblr:

From Table 5.91 shows that 25.7% University Libraries of the World and not a single Indian University Libraries use Tumblr to communicate with patrons along with other communication tools.

Table 5.91: % (count) of libraries using Tumblr for patron communication

			Tumblr		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	52	18	70
		% within Area	74.3%	25.7%	100.0%
Total		Count	91	18	109
		% within Area	83.5%	16.5%	100.0%

Graph 5.45. % score for using Tumblr



Chi-Square Tests table shows that there is a strong association between use of Tumblr by the World and Indian University libraries. Table 5.92 shows that Pearson Chi-Square value (χ^2) = 12.012, $p = .001$ ratio is significant.

Table 5.92: Chi-Square Tests for Tumblr

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.012 ^a	1	.001		
Continuity Correction ^b	10.219	1	.001		
Likelihood Ratio	17.877	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.3.5. Stumbleupon:

Table 5.93 indicated that very few i.e. 4.3% University libraries of the World and not a single Indian University library use Stumbleupon platform for communicating with patrons.

Table 5.93: % (count) of libraries using Stumbleupon for patron communication

			Stumbleupon		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	67	3	70
		% within Area	95.7%	4.3%	100.0%
Total	Count	106	3	109	
	% within Area	97.2%	2.8%	100.0%	

Graph 5.46. % score for using Stumbleupon

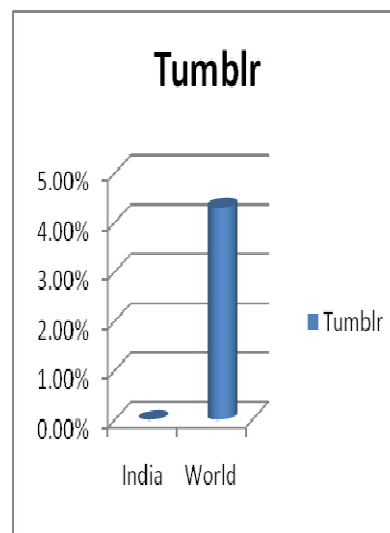


Table 5.94 shows Chi-Square test results. The table shows that Pearson Chi-Square value is 1.719 and $p=.190$ which was not significant at .05 significance level and there was not a significant ratio of use of Stumbleupon by the World and Indian University libraries.

Table 5.94: Chi-Square Tests for Stumbleupon

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.719 ^a	1	.190		
Continuity Correction ^b	.490	1	.484		
Likelihood Ratio	2.704	1	.100		
Fisher's Exact Test				.551	.261
N of Valid Cases	109				

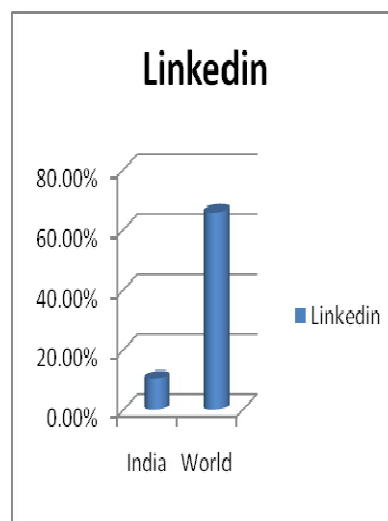
5.2.3.6. LinkedIn:

From Table 5.95 it is observed that 65.7% University libraries of the World and 10.3% Indian University libraries uses the LinkedIn professional network.

Table 5.95: % (count) of libraries using LinkedIn to link with patrons

			LinkedIn		Total
			No	Yes	
Area	India	Count	35	4	39
		% within Area	89.7%	10.3%	100.0%
	World	Count	24	46	70
		% within Area	34.3%	65.7%	100.0%
Total	Count	59	50	109	
	% within Area	54.1%	45.9%	100.0%	

Graph 5.47. % score for having LinkedIn account



Chi-Square test results in Table 5.96 show Pearson Chi-Square value (χ^2) = 31.024, $p = .001$ which indicates a strong association between use of the LinkedIn network in the World and Indian University libraries.

Table 5.96: Chi-Square Tests for LinkedIn

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	31.024 ^a	1	.001		
Continuity Correction ^b	28.830	1	.000		
Likelihood Ratio	34.561	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.3.7. Flickr:

Table 5.97 shows that 50% University libraries of the World and not a single Indian University library use Flickr platform for photo sharing.

Table 5.97: % (count) of libraries using Flickr to connect with patrons

			Flickr		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	35	35	70
		% within Area	50.0%	50.0%	100.0%
Total	Count	74	35	109	
	% within Area	67.9%	32.1%	100.0%	

Graph 5.48. % score for using Flickr

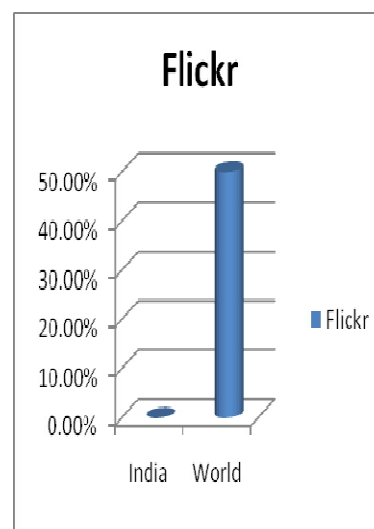


Table 5.98 shows the results of Chi-Square tests which show a strong association between use of Flickr by the World and Indian University Libraries. Pearson Chi-Square value (χ^2) = 28.723, $p = .001$

Table 5.98: Chi-Square Tests for Flickr

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28.723 ^a	1	.001		
Continuity Correction ^b	26.475	1	.000		
Likelihood Ratio	39.797	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

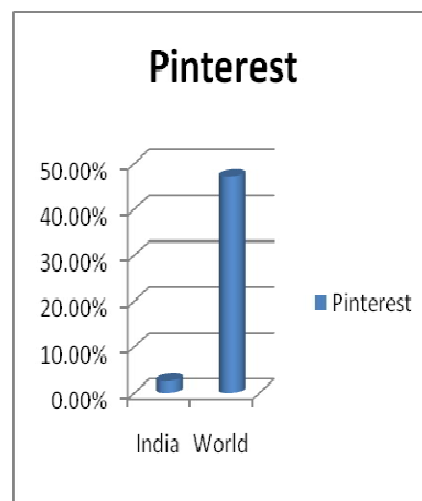
5.2.3.8. Pinterest:

Table 5.99 shows that 47.1% University libraries of the World and 2.6% Indian University libraries uses Pinterest tool.

Table 5.99: % (count) of libraries using Pinterest

			Pinterest		Total
			No	Yes	
Area	India	Count	38	1	39
		% within Area	97.4%	2.6%	100.0%
	World	Count	37	33	70
		% within Area	52.9%	47.1%	100.0%
Total		Count	75	34	109
		% within Area	68.8%	31.2%	100.0%

Graph 5.49. % score for using Pinterest



The result of Chi-Square tests are shown in Table 5.100 gives Pearson Chi-Square value (χ^2) = 23.190, $p = .001$ which indicates that the proportion of use of Pinterest by top World and Indian University libraries was statistically different from each other significantly.

Table 5.100: Chi-Square Tests for Pinterest

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23.190 ^a	1	.001		
Continuity Correction ^b	21.160	1	.000		
Likelihood Ratio	29.185	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

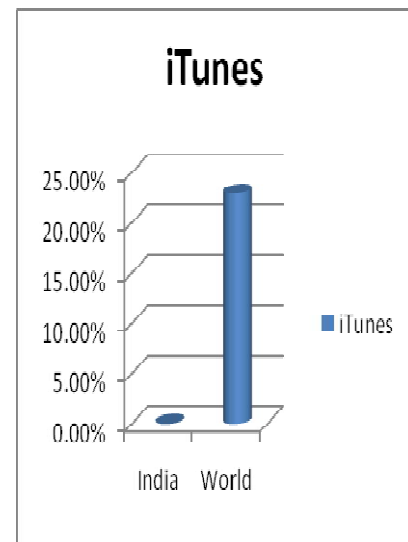
5.2.3.9. iTunes:

Table 5.101 shows that only 22.9% University libraries of the World and not a single Indian University library use iTunes for their audio files.

Table 5.101: % (count) of libraries using iTunes to publish audio files

			iTunes		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	54	16	70
		% within Area	77.1%	22.9%	100.0%
Total	Count	93	16	109	
	% within Area	85.3%	14.7%	100.0%	

Graph 5.50. % score for using iTunes



Chi-Square tests Table 5.102 shows that there was a strong association between use of iTunes by the World and Indian University libraries. Table 100 shows significant Pearson Chi-Square value (χ^2) = 10.448, $p = .001$.

Table 5.102: Chi-Square Tests for iTunes

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.448 ^a	1	.001		
Continuity Correction ^b	8.703	1	.003		
Likelihood Ratio	15.671	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.3.10. Instagram:

Table 5.103 shows that 33/70 means 47.1% University libraries of the World and 1/39 means 2.6% Indian University libraries uses Instagram application.

Table 5.103: % (count) of libraries using Instagram for photo sharing

			Instagram		Total
			No	Yes	
Area	India	Count	38	1	39
		% within Area	97.4%	2.6%	100.0%
	World	Count	37	33	70
		% within Area	52.9%	47.1%	100.0%
Total		Count	75	34	109
		% within Area	68.8%	31.2%	100.0%

Graph 5.51. % score for using Instagram

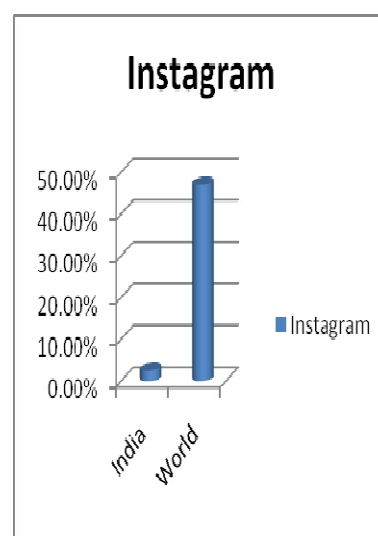


Table 5.104 shows Pearson Chi-Square value (χ^2) = 23.190, $p = .001$ and indicates that there was a significant and a strong association between use of the Instagram application in the World and Indian University libraries.

Table 5.104: Chi-Square Tests for Instagram

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23.190 ^a	1	.001		
Continuity Correction ^b	21.160	1	.000		
Likelihood Ratio	29.185	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.3.11. Delicious:

Table 5.105 shows that use of delicious application is very less in University libraries all over the World. Only 5.7% University libraries of the World and uses this tool and not a single University library from India uses this application.

Table 5.105: % (count) of libraries using Delicious

			Delicious		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	66	4	70
		% within Area	94.3%	5.7%	100.0%
Total	Count	105	4	109	
	% within Area	96.3%	3.7%	100.0%	

Graph 5.52. % score for using Delicious



The Chi-Square test result in Table 5.106 shows that there was not strong association between use of Delicious by the World and Indian University libraries Pearson Chi-Square value (χ^2) =2.313, but probability ratio $p=.128$ is not significant at 0.05 significance level.

Table 5.106: Chi-Square Tests for Delicious

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.313 ^a	1	.128		
Continuity Correction ^b	.979	1	.322		
Likelihood Ratio	3.627	1	.057		
Fisher's Exact Test				.295	.165
N of Valid Cases	109				

5.2.3.12. Google+:

Table 5.107 shows that 37.1% University libraries of the World and hardly 1% Indian University libraries uses the Google+ platform for patron communication.

Table 5.107: % (count) of libraries using Google+ to connect with users

			Google+		Total
			No	Yes	
Area	India	Count	38	1	39
		% within Area	97.4%	2.6%	100.0%
	World	Count	44	26	70
		% within Area	62.9%	37.1%	100.0%
Total	Count	82	27	109	
	% within Area	75.2%	24.8%	100.0%	

Graph 5.53. % score for using Google+

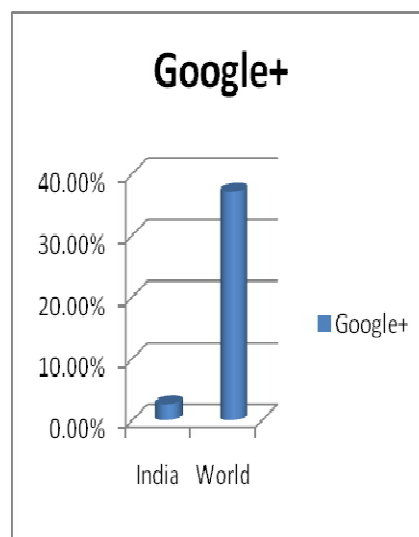


Table 5.108 shows the results of Chi-Square tests. It shows there was a strong association between use of Google+ by the World and Indian University Libraries. The significant Pearson Chi-Square value (χ^2) = 16.071, $p = .001$.

Table 5.108: Chi-Square Tests for Google+

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	16.071 ^a	1	.000		
Continuity Correction ^b	14.268	1	.000		
Likelihood Ratio	20.376	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.3.13. Foursquare:

Table 5.109 shows that total 34.3% University libraries in the World and not a single library from India use Foursquare platform for patron communication.

Table 5.109: % (count) of libraries using Foursquare for patron communication

			Foursquare		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	46	24	70
		% within Area	65.7%	34.3%	100.0%
Total	Count	85	24	109	
	% within Area	78.0%	22.0%	100.0%	

Graph 5.54. % score for using Foursquare

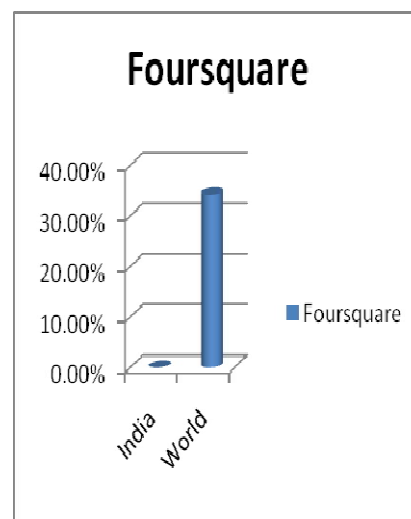


Table 5.110 results of Chi-Square tests show Pearson Chi-Square value (χ^2) = 17.147, $p = .001$ which is not significant at .05 significance level.

Table 5.110: Chi-Square Tests for Foursquare

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.147 ^a	1	.001		
Continuity Correction ^b	15.208	1	.000		
Likelihood Ratio	24.909	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

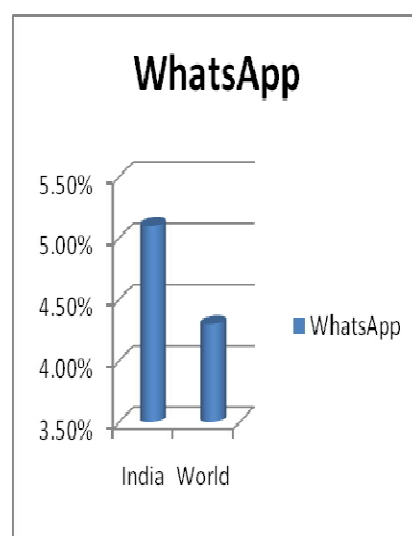
5.2.3.14. WhatsApp:

The Table 5.111 shows that use of WhatsApp in University libraries at the World level is 4.3% and at the Indian University libraries level it is 5.1%.

Table 5.111: % (count) of libraries using WhatsApp for patron communication

			Whatsapp		Total
			No	Yes	
Area	India	Count	37	2	39
		% within Area	94.9%	5.1%	100.0%
	World	Count	67	3	70
		% within Area	95.7%	4.3%	100.0%
Total	Count	104	5	109	
	% within Area	95.4%	4.6%	100.0%	

Graph 5.55. % score for using WhatsApp



The output of the Chi-Square tests given in the Table 5.112 shows a strong association between use of WhatsApp communication media by the World and Indian University libraries. The Pearson Chi-Square value (χ^2) = .041, p = .840 shows variations and no significant probability ratio

Table 5.112: Chi-Square Tests for Whatsapp

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.041 ^a	1	.840		
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.040	1	.841		
Fisher's Exact Test				1.000	.590
N of Valid Cases	109				

5.2.2.28. DATA ANALYSIS OF TOTAL WEB-BASED PATRON COMMUNICATION SERVICES/TOOLS:

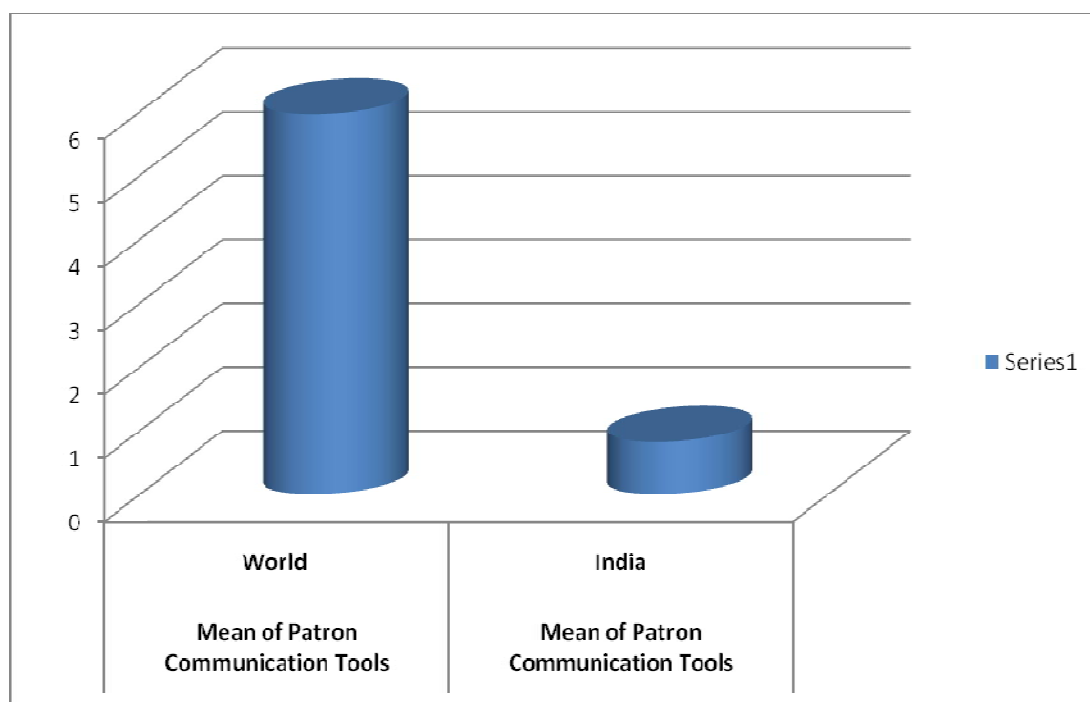
T-Tests for web-based patron communication tools/services:

For study total 14 patron communication tools and services are shortlisted. There are 70 World University libraries are offering a total web-based patron communication services which are having mean of 5.957 (± 2.8460) and that for 39 Indian University libraries, the mean score was 0.821 (± 1.2747) given in Table 5.113. Total patron education tools studied were 14.

Table 5.113: Group Statistics for total patron communication services

	Area_Wise	N	Mean	Std. Deviation	Std. Error Mean
Total Patron Communication Tools	World	70	5.957	2.8460	.3402
	India	39	.821	1.2747	.2041

Graph 5.56: Group statistics of mean of total patron communication services



The mean difference between the mean score of web-based patron communication services offered by 'Indian' and 'World' University libraries was 5.1366. This mean difference was statistically significant at 0.05 significant levels ($t=10.674$, $df=107$). This indicates that the World University libraries are offering total patron communication services much better than Indian University libraries.

Table 5.114: Independent Samples Test for total patron communication services

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Total Communication services	Equal variances assumed	24.625	.000	10.674	107	.000	5.1366	.4812
	Equal variances not assumed			12.948	103.313	.000	5.1366	.3967

5.2.4: DATA ANALYSIS OF WEB-BASED PUBLISHING PLATFORM FOR PATRONS:

The cluster of 6 publishing platforms and services or initiatives taken by University libraries in the World and India are included in this part. Analysis of data is given below

5.2.4.1. Open Access Initiatives:

From Table 5.115 shows that 81.4% university libraries of the World and 15.4% Indian University libraries have taken open access initiatives for their repositories and publications of patrons.

Table 5.115: % (count) of libraries taking open access initiatives

			Open Access Initiatives		Total
			No	Yes	
Area	India	Count	33	6	39
		% within Area	84.6%	15.4%	100.0%
	World	Count	13	57	70
		% within Area	18.6%	81.4%	100.0%
Total		Count	46	63	109
		% within Area	42.2%	57.8%	100.0%

Graph 5.57. % score for taking OAI

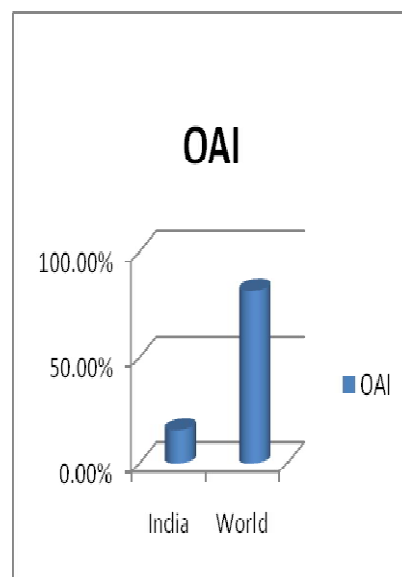


Table 5.116 shows the results of the Chi-Square tests. It shows there was a strong association between Open Access Initiatives by the World and Indian University libraries. The Pearson Chi-Square value (χ^2) = 44.788, and significant $p = .001$ at 0.05 significant level.

Table 5.116: Chi-Square Tests for Open access initiatives

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	44.788 ^a	1	.001		
Continuity Correction ^b	42.121	1	.000		
Likelihood Ratio	47.764	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.4.2. Platform for authors and journals:

Table 5.117 shows that 62.9% University libraries of the World and only 2.6% Indian University libraries provides a platform to publish their research work in the form of repository or journal or bulletin.

Table 5.117: % (count) of library websites providing platform for authors and journals

			Platform for authors and journals		Total
			No	Yes	
Area	India	Count	38	1	39
		% within Area	97.4%	2.6%	100.0%
	World	Count	26	44	70
		% within Area	37.1%	62.9%	100.0%
Total		Count	64	45	109
		% within Area	58.7%	41.3%	100.0%

Graph 5.58. % score for providing platform for author and journals

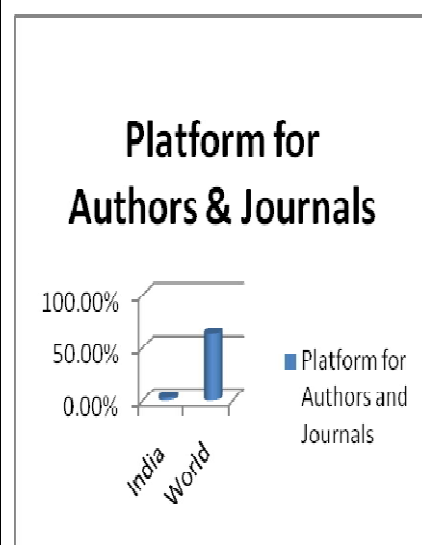


Table 5.118 shows the result of Chi-Square tests. It shows Pearson Chi-Square value (χ^2) = 37.560, $p = .001$ and therefore there was a strong association between platform to authors and journals of the World and Indian University libraries.

Table 5.118: Chi-Square Tests for Platform to authors and journals

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square ^a	37.560	1	.001		
Continuity Correction ^b	35.114	1	.000		
Likelihood Ratio	46.116	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.4.3. University Records Management:

From Table 5.119 shows that 84.3% University libraries of the World and only 7.7% Indian University libraries keeps and manages university records.

Table 5.119. % (Count) on library websites managing university records

			University Records Management		Total
			No	Yes	
Area	India	Count	36	3	39
		% within Area	92.3%	7.7%	100.0%
	World	Count	11	59	70
		% within Area	15.7%	84.3%	100.0%
Total		Count	47	62	109
		% within Area	43.1%	56.9%	100.0%

Graph 5.59. % score for managing university records

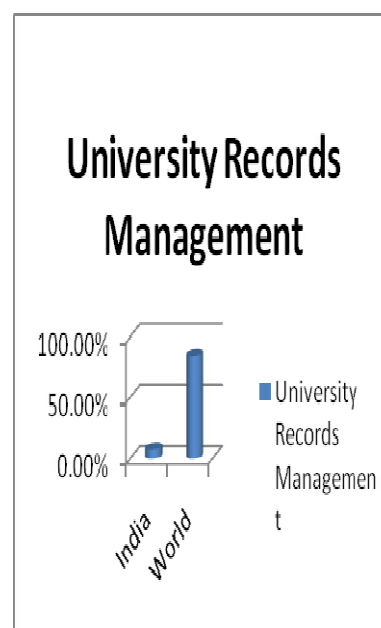


Table 5.120 shows the result of Chi-Square tests. It shows there was a strong association between the University records management by the world and Indian University libraries. The significant Pearson Chi-Square value (χ^2) = 59.908, $p = .001$

Table 5.120: Chi-Square Tests for university records management

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	59.908 ^a	1	.001		
Continuity Correction ^b	56.825	1	.000		
Likelihood Ratio	66.996	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.4.4. Anti-plagiarism Software access/ plagiarism help:

From Table 5.121 shows that 28/70 (40%) University libraries of the World and 7/39 (15.4%) Indian University libraries give access to anti-plagiarism software like Turnitin or provide help in the form of guides and instructions.

Table 5.121. % (count) of library websites offering Anti-plagiarism software access/help

			Anti-plagiarism Software access/ Plagiarism help		Total
			No	Yes	
Area	India	Count	32	7	39
		% within Area	82.1%	17.9%	100.0%
	World	Count	42	28	70
		% within Area	60.0%	40.0%	100.0%
Total	Count	74	35	109	
	% within Area	67.9%	32.1%	100.0%	

Graph 5.60. % score for offering Anti-plagiarism software access/help

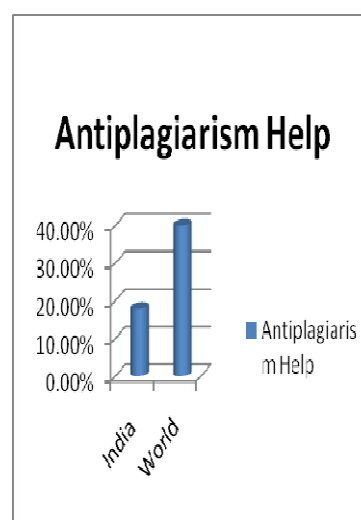


Table 5.122 shows the result of Chi-Square tests. It shows there was strong association between Anti-plagiarism software help by the World and Indian University libraries. The Pearson Chi-Square value (χ^2) =5.587, p =.018 which was significant at .05 significance level.

Table 5.122: Chi-Square Tests for Anti-plagiarism software access/ help

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.587 ^a	1	.018		
Continuity Correction ^b	4.621	1	.032		
Likelihood Ratio	5.908	1	.015		
Fisher's Exact Test				.020	.014
N of Valid Cases	109				

5.2.4.5. Citation Tools:

Table 5.123 shows that 52.9% university libraries of the world and 5.1% Indian University libraries provides citation tools, guides and help for their research patrons.

Table 5.123: % (count) of library websites providing access to citation tools

			Citation Tools		Total
			No	Yes	
Area	India	Count	37	2	39
		% within Area	94.9%	5.1%	100.0%
	World	Count	33	37	70
		% within Area	47.1%	52.9%	100.0%
Total	Count	70	39	109	
	% within Area	64.2%	35.8%	100.0%	

Graph 5.61, % score for providing access to citation tools

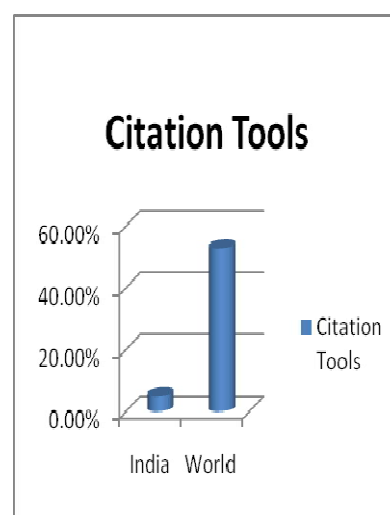


Table 5.124 shows the results of Chi-Square tests. It shows there was a strong association between Citation Tools/help by the World and Indian University libraries. The significant Pearson Chi-Square value (χ^2) = 24.831, $p = .001$

Table 5.124: Chi-Square Tests for Citation Tools

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	24.831 ^a	1	.001		
Continuity Correction ^b	22.797	1	.000		
Likelihood Ratio	29.577	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.2.4.6. Coursework:

From Table 5.125 it has shown that 14.3% University libraries of the World and not a single Indian University library conducts and provides help to coursework conducted by universities.

Table 5.125: % (count) of libraries providing help for coursework

			Coursework		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	60	10	70
		% within Area	85.7%	14.3%	100.0%
Total	Count	99	10	109	
	% within Area	90.8%	9.2%	100.0%	

Graph 6.62. % score for providing help for coursework

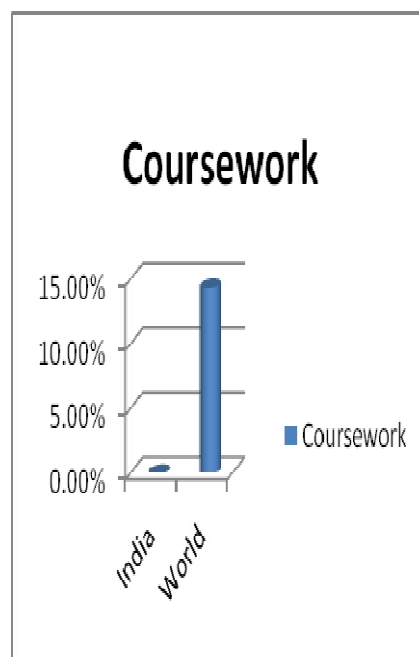


Table 5.126 shows the results of Chi-Square tests. The Pearson Chi-Square value (χ^2) = 6.134, $p = .013$ indicates that there was a strong association between use of Google+ by the World and Indian University libraries.

Table 5.126: Chi-Square Tests for Coursework

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.134 ^a	1	.013		
Continuity Correction ^b	4.540	1	.033		
Likelihood Ratio	9.412	1	.002		
Fisher's Exact Test				.013	.009
N of Valid Cases	109				

5.2.4.7. DATA ANALYSIS OF TOTAL WEB-BASED PUBLISHING PLATFORM FOR PATRONS:

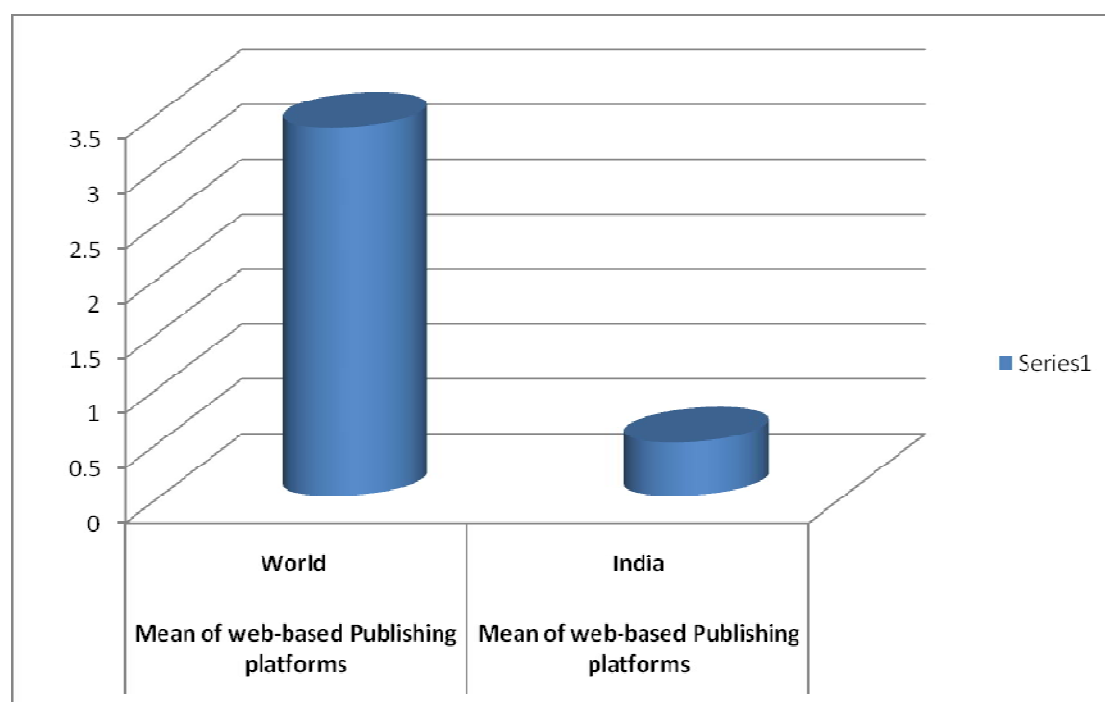
T-Tests for web-based publishing platform for patrons:

There were 70 World University libraries having total web-based publishing platform for patrons which are having mean of 3.357 (± 1.5883) and that for 39 Indian University libraries, the mean score was 0.487 (± 0.9140) given in Table 5.127.

Total 5.127: Group Statistics for publishing platform for patrons

	Area_Wise	N	Mean	Std. Deviation	Std. Error Mean
Total Publishing Platform for patrons	World	70	3.357	1.5883	.1898
	India	39	.487	.9140	.1464

Graph 5.63: Group statistics of mean of total publishing platforms for patrons



The mean difference between the mean score of web-based publishing platform for patrons offered by 'Indian' and 'World' University libraries was 2.8700. This mean difference was statistically significant at 0.05 significant levels ($t=10.356$, $df=107$). This is indicated in Table 5.128 that the World University libraries are offering total

publishing platform and services for patrons about three times better than Indian university libraries.

Total 5.128: Independent Samples Test for publishing platform for patrons

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Total Publishing platform for patrons	Equal variances assumed	16.577	.000	10.356	107	.000	2.8700	.2771
	Equal variances not assumed			11.973	106.855	.000	2.8700	.2397

5.2.5. DATA ANALYSIS OF TOTAL WEB-BASED SERVICES:

T-Tests for web-based services:

The T-test was applied to compare all 59 web-based services offered by World and Indian University libraries score data discussed above.

There are 70 World University libraries are having total web-based services mean of 33.629 (± 10.9705) and that for 39 Indian University libraries, the mean score was 8.103 (± 8.1201) given in Table 5.129.

Table 5.129: Group Statistics for total web-based services

	Area_Wise	N	Mean	Std. Deviation	Std. Error Mean
Total Web-based Services	World	70	33.629	10.9705	1.3112
	India	39	8.103	8.1201	1.3003

The mean difference between the mean score of all web-based services offered by 'Indian' and 'World' University libraries was 25.5260. This mean difference was

statistically significant at 0.05 significant levels ($t=12.710$, $df=107$). This is indicated in Table 5.130 that World University libraries are offering total web-based services for patrons better than Indian University libraries.

Graph 5.64: Group statistics of mean of total web-based services

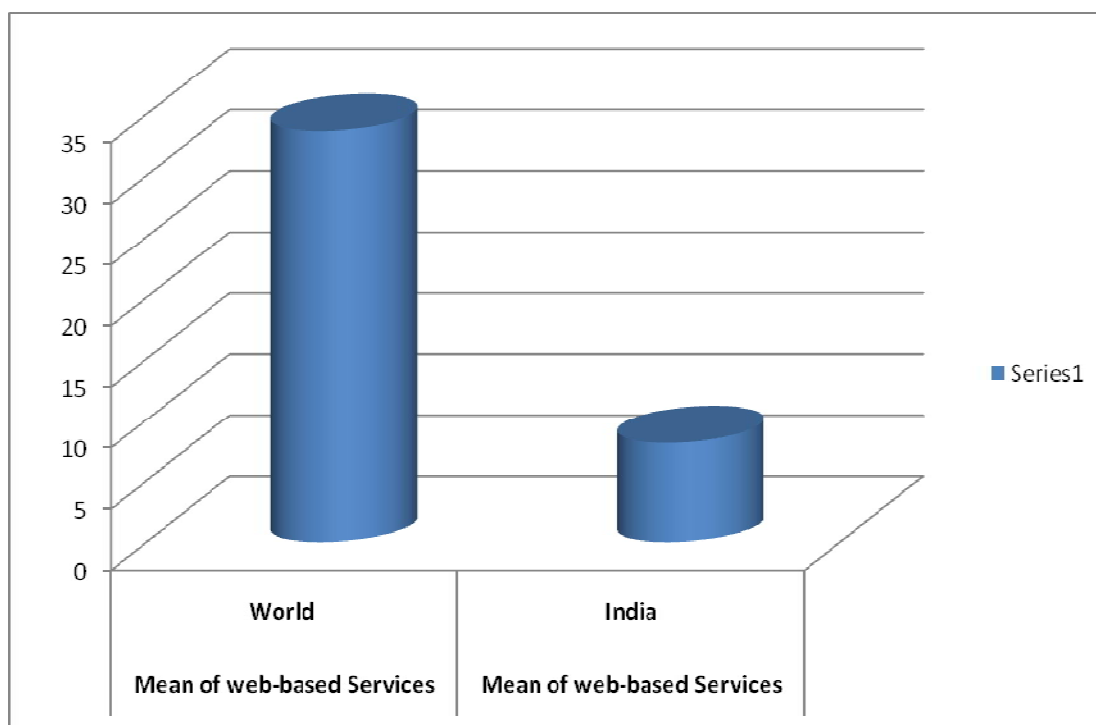


Table 5.130: Independent Samples Test for total web-based services

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Total	Equal variances assumed	4.919	.029	12.710	107	.000	25.5260	2.0084
	Equal variances not assumed			13.823	98.491	.000	25.5260	1.8466

PART B

5.3. DATA ANALYSIS OF WEB-BASED BEST PRACTICES:

In this the investigator selected few best practices offered by a sample University Libraries and data analysis of those best practices is given below

5.3.1. Online Exhibitions:

Table 5.131 shows that of the World and Indian University libraries only 28.6% libraries from all parts of the world except India displays online exhibitions on their websites.

Table 5.131: % (count) of libraries conducting online exhibitions

			Online Exhibitions		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	50	20	70
		% within Area	71.4%	28.6%	100.0%
Total		Count	89	20	109
		% within Area	81.7%	18.3%	100.0%

Graph 5.65. % score for conducting online exhibitions

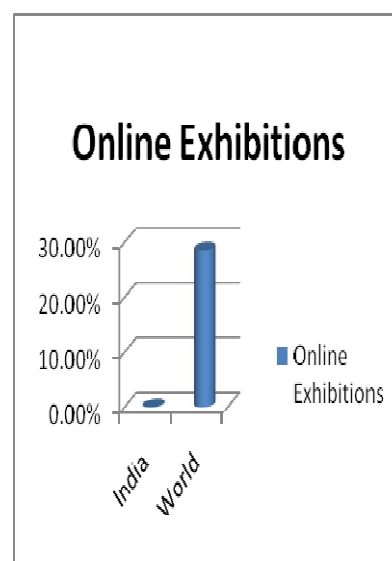


Table 5.132 shows the results of Chi-Square tests. It shows there was a strong association between use of online exhibitions by the World and Indian University libraries. The significant Pearson Chi-Square value (χ^2) = 13.647, p = .001

Table 5.132: Chi-Square Tests for online exhibitions

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.647 ^a	1	.001		
Continuity Correction ^b	11.806	1	.001		
Likelihood Ratio	20.150	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.3.2. Virtual Tour:

Table 5.133 shows that only 12.9% University libraries of all parts of the World and 2.6% University libraries from India provides services to go through virtual tour to the library on their website.

Table 5.133: % (count) of library websites providing virtual tour to library

			Virtual Tour		Total
			No	Yes	
Area	India	Count	38	1	39
		% within Area	97.4%	2.6%	100.0%
	World	Count	61	9	70
		% within Area	87.1%	12.9%	100.0%
Total		Count	99	10	109
		% within Area	90.8%	9.2%	100.0%

Graph 5.66. % score for providing virtual library tour

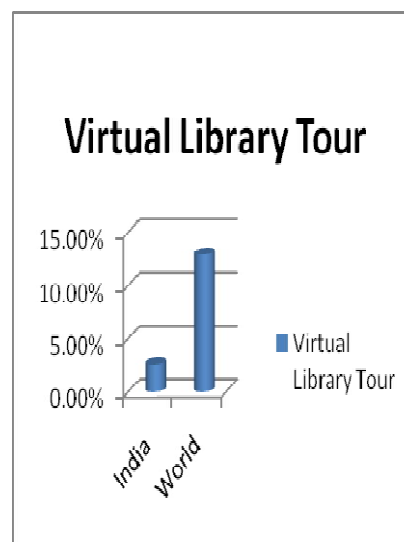


Table 5.134 shows the result of Chi-Square tests. It shows there was an association between use of Virtual tour of the World and Indian University libraries. The non-significant Pearson Chi-Square value (χ^2) = 3.185, $p = .074$ at 0.05 significance level.

Table 5.134: Chi-Square Tests for Virtual Tour

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.185 ^a	1	.074		
Continuity Correction ^b	2.069	1	.150		
Likelihood Ratio	3.814	1	.051		
Fisher's Exact Test				.092	.069
N of Valid Cases	109				

5.3.3. Wikis:

The below Table 5.135 shows that 37.1% University libraries of the World and 2.6% University libraries from India have their wikis through which they reach wider audience and update it time to time.

Table 5.135: % (count) of libraries having their wiki pages

			Wikis		Total
			No	Yes	
Area	India	Count	38	1	39
		% within Area	97.4%	2.6%	100.0%
	World	Count	44	26	70
		% within Area	62.9%	37.1%	100.0%
Total		Count	82	27	109
		% within Area	75.2%	24.8%	100.0%

Graph 5.67. % score for having wiki pages

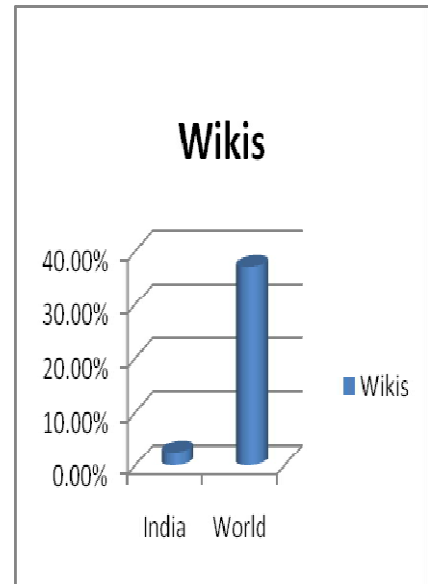


Table 5.136 shows the result of Chi-Square tests. It shows value of Pearson Chi-Square (χ^2) = 16.071, p = .001 and indicates that there was a strong association between library wikis of the World and Indian University libraries.

Table 5.136: Chi-Square Tests for Wikis

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	16.071 ^a	1	.001		
Continuity Correction ^b	14.268	1	.000		
Likelihood Ratio	20.376	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.3.4, Interactive games/ puzzles and movie/ short films:

Table 5.137 shows that from the different part of the world only 5.7% University libraries took best practices like creating interactive games, puzzles, quizzes or creating short movies or films for their patrons to make library learning more interesting. No Indian University library took such initiatives so far.

Table 5.137: % (count) of libraries using Interactive games, puzzles and movies/short films

			Games,puzzles, etc		Total
			No	Yes	
Area	India	Count	39	0	39
		% within Area	100.0%	0.0%	100.0%
	World	Count	66	4	70
		% within Area	94.3%	5.7%	100.0%
Total	Count	105	4	109	
	% within Area	96.3%	3.7%	100.0%	

Graph 5.68. % score for using Interactive games, puzzles and movies/short films

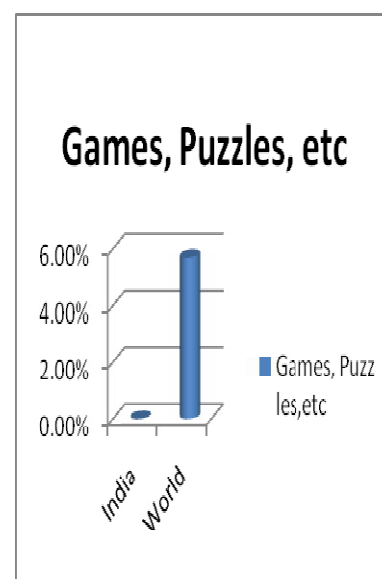


Table 5.138 shows the result of Chi-Square tests. It does not show there was an association between this best practice offered by the World and Indian University libraries. The Pearson Chi-Square value (χ^2) = 2.313, $p = .128$ which was not significant at 0.05 significance level.

Table 5.138: Chi-Square Tests for interactive games, puzzles and movie/ short films

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.313 ^a	1	.128		
Continuity Correction ^b	.979	1	.322		
Likelihood Ratio	3.627	1	.057		
Fisher's Exact Test				.295	.165
N of Valid Cases	109				

5.3.5. DATA ANALYSIS OF TOTAL WEB-BASED BEST PRACTICES:

T-Tests for web-based best practices:

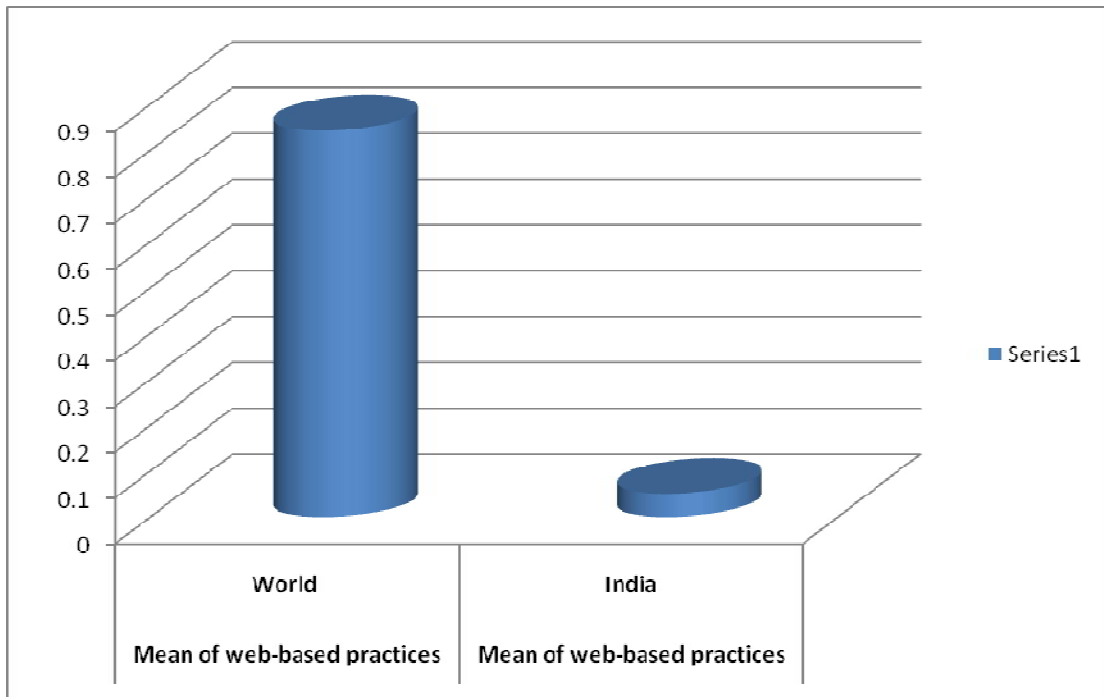
The T-test was applied to compare all best practices by World and Indian University libraries score data discussed above.

Total 70 World University libraries were offering total web-based practices which are having mean of 0.843 (± 0.9111) and that of 39 Indian University libraries, the mean score was 0.051 (± 0.2235) given in Table 5.139.

Table 5.139: Group Statistics for total web-based best practices

	Area_Wise	N	Mean	Std. Deviation	Std. Error Mean
Total Score web-based best practice	World	70	.843	.9111	.1089
	India	39	.051	.2235	.0358

Graph 5.69: Group Statistics of mean score of total web-based best practices



The mean difference between the mean score of web-based best practices conducted by ‘Indian’ and ‘World’ University libraries was 0.7916. This mean difference was not statistically significant at 0.05 significant levels ($t=5.327$, $df=107$). This is indicated in Table 5.140 that World University libraries were conducting total web-based best practices better than Indian University Libraries.

Table 5.140: Independent Samples Test for web-based best practices

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Total Score web-based best Practices	Equal variances assumed	70.509	.000	5.327	107	.000	.7916
	Equal variances not assumed			6.906	82.949	.000	.7916

PART C

5.4. DATA ANALYSIS OF SINGLE WEB PAGE UNIVERSITY LIBRARIES

The table 5.141 shows that there were 30.8% Indian University libraries having only single static webpage and not a dynamic website. There was not a single top World University with only single static web page.

Table 5.141: % (count) of libraries having Single web page

		Single web page university libraries		Total	
		No	Yes		
Area	India	Count	27	12	39
		% within Area	69.2%	30.8%	100.0%
	World	Count	70	0	70
		% within Area	100.0%	0.0%	100.0%
Total	Count	97	12	109	
	% within Area	89.0%	11.0%	100.0%	

The Table 5.142 shows there was a strong association between single webpage libraries in the World and Indian University libraries. The Pearson Chi-Square value was 24.203 while probability ratio $p = 0.001$ significant at 0.05 significance level.

Table 5.142: Chi-Square Tests for Single webpage university libraries

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	24.203 ^a	1	.001		
Continuity Correction ^b	21.164	1	.000		
Likelihood Ratio	27.437	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	109				

5.5. DATA ANALYSIS AND CORRELATION BETWEEN WORLD AND INDIAN UNIVERSITIES RANKINGS WITH THEIR LIBRARY RANKINGS AS PER WEB-BASED SERVICES OFFERED BY THEM:

In this study, the investigator has selected world universities ranked by "Webometrics Ranking of World Universities" and after data analysis investigator ranked the selected top University libraries depending on how many web-based services offered by them.

Spearman’s Correlations between world & India rankings of universities with their library rankings depending on web-based services offered:

Below table 5.143 shows the Spearman Correlation between ‘World’ University rankings as per "Webometrics Ranking of World Universities" and their library rankings given on the basis of web-based services offered by them was 0.465 which was statistically significant at 0.01 significance level ($p=0.001$). On the other hand, for Indian Universities the correlation between University ranking as per NAAC CGPA score and library ranking as per web-based services offered by these universities were 0.118 which was statistically not significant at 0.05 significance level ($p=0.474$)

Table 5.143. Correlations between world/India university and their library rankings.

Area_Wise			World_Uni v_Ranking	Library_Ran king	
Spearman's rho	World	World_Uni v_Ranking	Correlation Coefficient	1.000	.465**
			Sig. (2-tailed)	.	.001
			N	70	70
		Library_Ra nking	Correlation Coefficient	.465**	1.000
			Sig. (2-tailed)	.000	.
			N	70	70

Area_Wise			World_Univ_Ranking	Library_Ranking	
Spearman's rho	India	India_Univ_Ranking	Correlation Coefficient	1.000	.118
			Sig. (2-tailed)	.	.474
			N	39	39
		Library_Ranking	Correlation Coefficient	.118	1.000
			Sig. (2-tailed)	.474	.
			N	39	39
**. Correlation is significant at the 0.01 level (2-tailed).					

5.6. CONCLUSION:

In this chapter the data analysis of web-based services and best practices was described in tabular forms. Cross tables for each web-based service and best practice showed a total average score along with a count for the world and Indian university libraries. Chi-Square test tables explained the Chi-Square values and p value to show the statistical significance of results. T-test was applied for total scores of web-based services and best practices which gave mean score and an average mean score of total services in the 'World' and Indian University Libraries. At last, the Spearman correlation test was applied to correlated and find coefficient value of the World and Indian University Rankings with their Library Rankings given according to their score of web-based services offered.

Chapter6

**OBSERVATIONS, FINDINGS,
SUGGESTIONS AND
CONCLUSION**

CHAPTER 6

OBSERVATIONS, FINDINGS, SUGGESTIONS AND CONCLUSION

6.1. INTRODUCTION:

This is the last and very important chapter, which contains the gist of the whole study. In this chapter investigator summarized observations and findings of the study and gave suggestions for improvement of web-based services and best practices in University Libraries. Before concluding this study, the investigator gave scope for further studies and suggested areas in which new researchers can do study in depth.

6.2. OBSERVATIONS AND FINDINGS:

After collecting data for 63 web-based services and best practices offered by sample 109 university libraries, the investigator compares the data using Chi-Square test, T-Test and percentage of services offered by 'world' and 'Indian' University Libraries. First, in Chapter 4, the investigator gave an overview of all 63 web-based services and best practices with examples. Then in chapter 5 "A Quantitative Data Analysis of Library Web-Services and Best Practices Related To The University Libraries Context" all cross tables of percentages, Chi-Square test tables and T-Test findings were interpreted for each and every service for 'world' and 'Indian' University Libraries. The Spearman Correlation coefficient was calculated for universities actual ranking and library rankings calculated on the basis of web-based services offered by those University Libraries.

Below the most relevant observations and findings are mentioned.

6.2.1 WEB-BASED SERVICES OFFERED BY UNIVERSITY LIBRARIES:

To compare all 59 web-based services offered in four clusters by 'World' and 'Indian' University libraries were analysed by applying T-test. It is observed that sample 70 World University libraries mean score of web-based services were 33.629 (± 10.9705) and that for 39 Indian University libraries, the mean score was 8.103 (± 8.1201). The

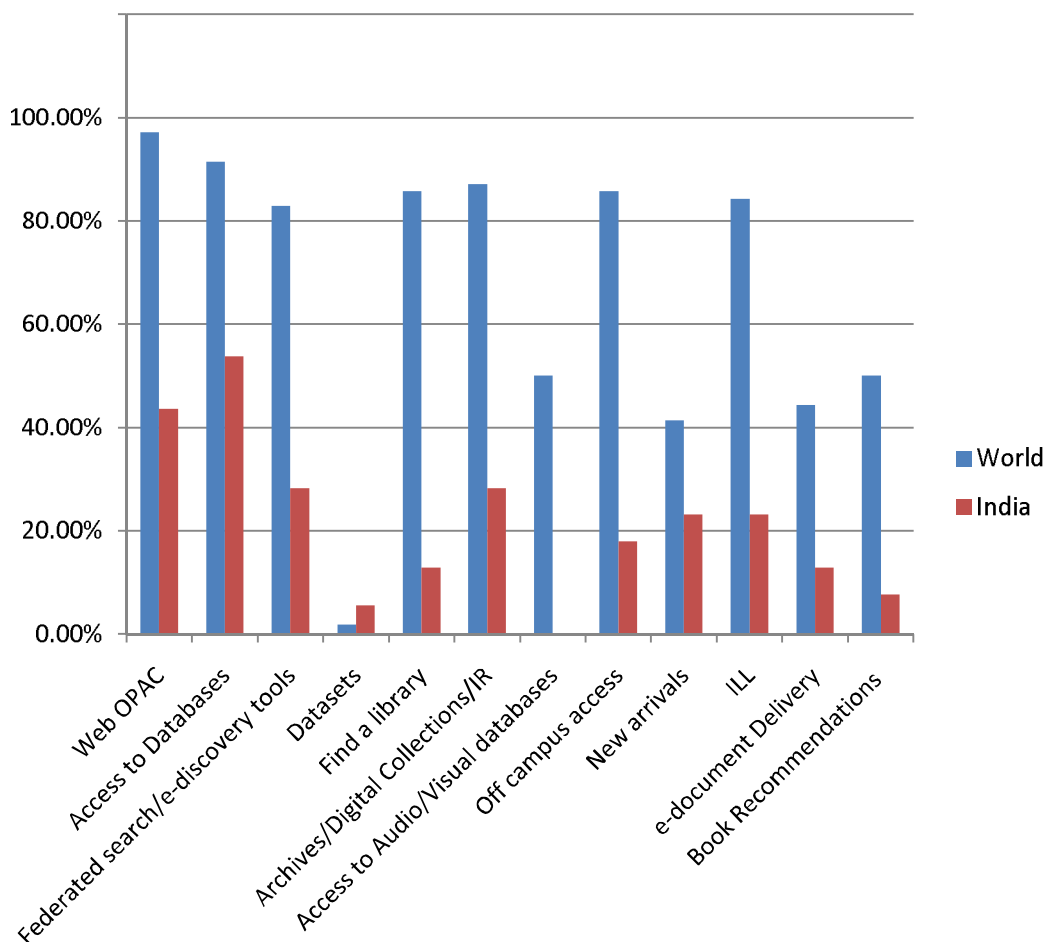
mean difference between the mean score of all web-based services offered by 'Indian' and 'World' University libraries was 25.5260. This mean difference was statistically significant at 0.05 significant levels ($t=12.710$, $df=107$). This indicates that World University libraries offer better web-based services for patrons than Indian University libraries. Among all web-based services percentage score of offering text instruction on websites service by both 'world' and 'India' was 81.7%, and for access to web OPAC and database services was 78% so these are the only 2 services where Indian University Libraries more or less cope up with the International University Libraries when it comes to web-based services

6.2.1.1. WEB-BASED BIBLIOGRAPHICAL SERVICES:

It is observed that, among web-based bibliographical services score of offering access to the database and web OPAC score in both 'World' and 'India' University libraries was high i.e. 78% and access to dataset score was very low i.e. 7.3%. The overall score of web-based 'federated search/e-discovery tools service', 'access to archives/digital collection/IR service', 'Off campus access service' and ILL service is above 60%, whereas 'access to visual database service', 'new arrival service', 'e-document delivery service' and 'book recommendation service' is below 35%. In all bibliographical services, except Dataset service world universities scored much higher than Indian universities.

Graph 6.1 is self-explanatory to show the score of each bibliographical service area wise.

Graph 6.1 Average score of bibliographical services of 'world' and 'Indian' University libraries



The Chi-Square test indicated that only for Datasets and New Arrival services the p value is not significant to significance level 0.05. All remaining services show a strong relation between the 'world' and 'Indian' university libraries, the Indian libraries always scores significantly lower.

From the top five World University libraries, the Harvard University, the Stanford University and the Cornell University are offering all bibliographical services and ranked first. From India, the Jawaharlal Nehru University, New Delhi, ranked first in offering 10 out of 12 bibliographical services and TISS ranked second in offering 3/4th bibliographical services in India. Still 13 universities out of 39 do not offer a single bibliographical service. In Indian Universities, libraries are good enough in providing access to databases, Web OPAC, federated search/e-discovery tools to

search information, University archives, displaying new arrivals, inter library loan facility, but still need to improve in providing web-based bibliographical services mentioned in this study like preparing and providing access to datasets, find a library service, providing access to visual databases, providing e-document delivery service and online book recommendation services.

Annexure 6.1 shows which universities bibliographical services count was high and low from different continents and regions.

6.2.1.2. WEB-BASED PATRON EDUCATION TOOLS/SERVICES:

It is observed that, the use of text instruction to educate and train patrons in both 'World' and 'India' University libraries are high i.e. 81.7% and conducting online or live sessions for patron's service scored very low i.e. 4.6%. So, not only in India but university libraries from different parts of the world can adopt this method of delivering instructions or educating patrons.

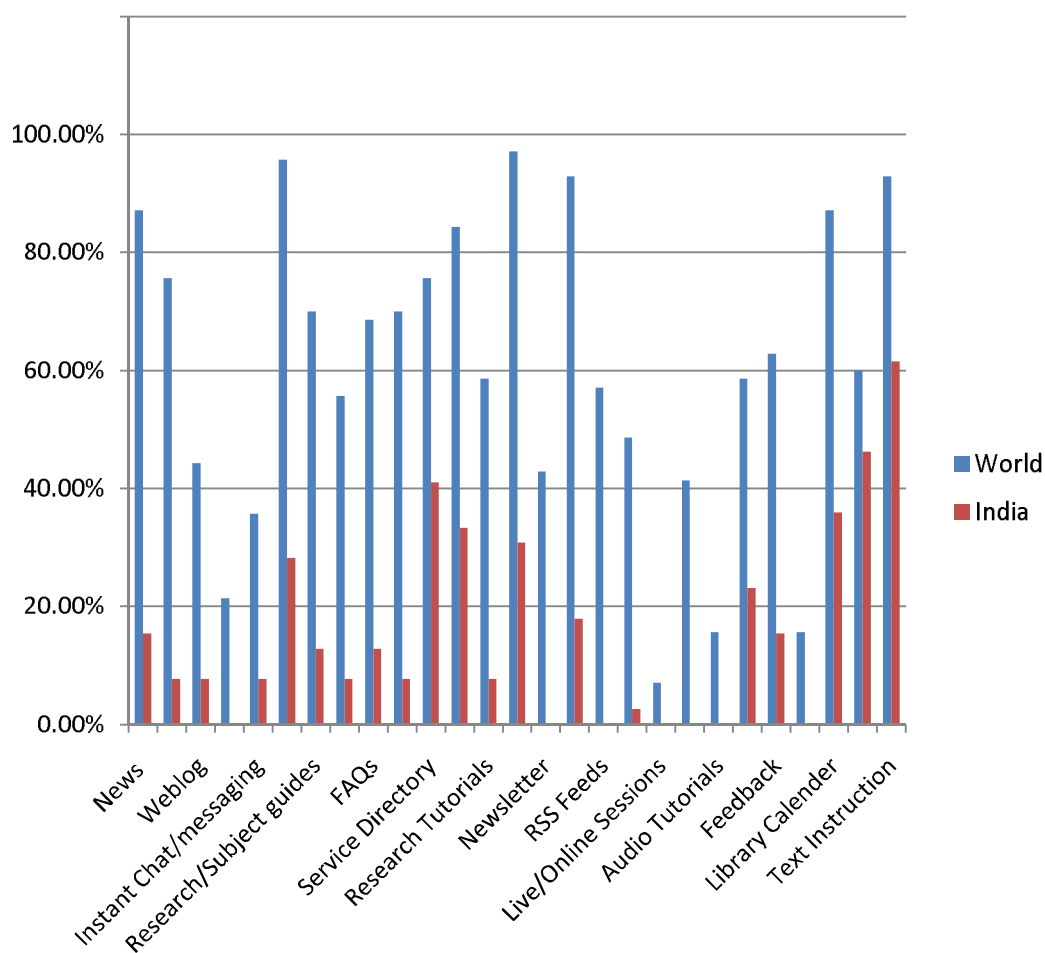
At World University level, is observed that for educating patrons, the score of 'tips for access and use', 'ask us', 'help/user guides' and 'text instruction' was above 90% and 'News service', 'library calendar' and 'PPTs/PDFs' for updating and educating patrons score is above 80%. More than 50% World University libraries are educating patrons using 'upcoming events', 'service directory', 'research/subject guides', 'youtube', 'FAQs', 'feedback', 'photo gallery', 'research tutorials', 'maps directions', 'RSS feeds' and 'video tutorials' services and tools. Range of 35-50% world university libraries were providing and using 'mobile application', 'weblog', 'newsletter', 'Prezi/Slideshare', instant chat/messaging' tools/service. 21.4% universities use WordPress platform, 15.7% prepares audio tutorials and gives online or live video library and 7.1% universities conduct live or online sessions for educating patrons.

On the contrary, Indian University libraries score of these services was below 62%. The score of Indian University libraries for educating and orienting patrons by publishing text instructions on library website was 61.50% and all other services score was below 50%. The score of photo gallery was 46.2%, service directory was 41%,

library calendar was 35.9%, PPTs/PDFs was 33.3%, ask us is 28.2%, help/user guides was 17.9%, news and feedback service is 15.4%, research/subject guides and FAQs is 12.8% and score of upcoming events, YouTube, research tutorials, video tutorials, weblog, instant chat/messaging service was 7.7%. No Indian University library is using RSS feeds, newsletter, Prezi/Slideshare, WordPress, audio tutorials, live/online video library or live/online sessions for patron education.

Below Graph 6.2 is self-explanatory to show the score of each patron education tool/service area wise.

Graph 6.2: Average score of patron education tools/ services of 'World' and 'Indian' University libraries



T-Test results were showing that there were 70 'World' University libraries offering total web-based patron education services mean of 16.229 (± 5.7513) and that for 39

Indian University libraries, the mean score was 4.231 (± 4.1133). The 'World' University libraries are offering better patron education services than Indian University Libraries.

From the 'World' University libraries, the Stanford University offers maximum patron education tools and services, i.e. 26 services out of 27 services. In India, the Jawaharlal Nehru University scored high by offering 19 patron education services. Indian universities are good in providing text instructions, photo gallery service, providing library calendar/timings, service directory, use of PPTs/PDFs, providing tips for access and use of library, ask us service, providing user guides and updating library news. Indian libraries have scope to improve their patron education services like updating them about upcoming events in the library, using blogs, WordPress, providing instant chat or messaging service, providing research or subject guides, preparing video tutorials, preparing FAQs for solving common queries, using video tutorials and publishing on YouTube platform, preparing research tutorials to support and promote research, publishing library newsletters, RSS feeds, use of mobile application, live/online presentations, use of interactive Prezi tools for presentation, preparing audio tutorials for patron education.

Chi Square test indicate $p=.088$ and $p=.164$ live/online sessions and photo gallery tools/services respectively which were not significant at .05 significance level. All other results were significant at .05 significance levels.

Annexure 6.2 shows which universities are offering maximum patron education services using different web tools and technologies along with the universities which are not good enough in providing web-based patron education.

6.2.1.3. WEB-BASED PATRON COMMUNICATION SERVICES/TOOLS:

From T-Test for comparing the means of the 'World' and Indian University libraries given in the score data format shows that world university libraries are offering a total web-based patron communication services mean of 5.957 (± 2.8460) and that Indian University libraries, the mean score was 0.821 (± 1.2747) given in Table 25. The mean difference between the mean score of web-based patron communication services offered by 'Indian' and 'World' University libraries was 5.1366. This mean

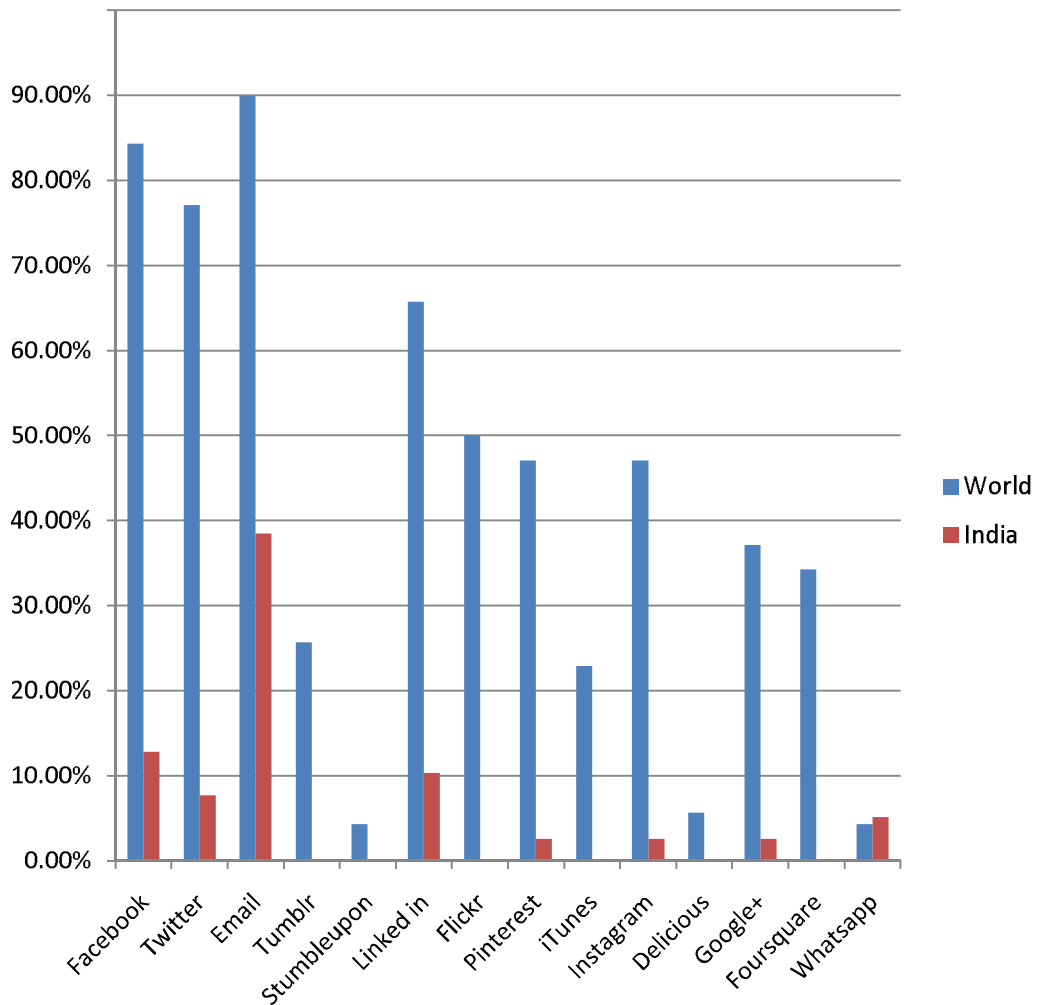
difference was statistically significant at 0.05 significant levels ($t=10.674$, $df =107$). This indicates that World University libraries are offering total patron communication services much better than Indian University libraries.

From Chi-Square analysis and percentage analysis of data collected for 109 university libraries it is observed that from 14 web-based patron communication services and tools Email communication scored high i.e. 71.6% University libraries use email for communication and vice versa only 2.8% libraries use Stumbleupon platform for patron communication. Chi-Square test indicated that Stumbleupon, Delicious and WhatsApp communication tools and services are not significant at 0.05 significant levels of 'World' and 'Indian' University libraries.

The score of World University libraries and Indian University libraries using these patron education tools showed major difference. If we see email then 90% world University libraries use this media while only 38.5% Indian Universities using this media for patron communication which is overall higher in both cases. Facebook tool was used by 84.3% World University libraries and 12.8% Indian University libraries. Twitter was used by 77.1% World University libraries and 10.3% Indian University Libraries. A LinkedIn platform for networking used by 65.7% World university libraries and 7.7% Indian University libraries. 50% World University libraries were using the Flickr platform while only 5.1% Indian University libraries were using the Flickr platform. Instagram and Pinterest tools 47.1% World University libraries and 2.6% Indian University libraries were using. Google+ platform is used by 37.1% world University libraries and 2.6% Indian University libraries. World University libraries were using Foursquare 34.3%, Tumblr 25.7%, iTunes 22.9%, Delicious 5.7%, Stumbleupon 4.3% and WhatsApp 4.3% on the contrary not a single Indian University library was using this platform for patron communication.

Graph 6.3 shows the score of each patron communication tool/service area wise.

Graph 6.3 Average score of patron communication service of 'World' and 'Indian' university libraries



From world sample the Harvard University and the Oxford University offer about 12 patron communication tools whereas the Université Djillali Liabes, the Mansoura University from North Africa and the University of Tehran from Middle East uses only one patron communication tool whereas the Behna University and the Alexandria University from North Africa does not use as a single web-based communication tools to communicate with patrons. The Jawaharlal Nehru University from India offers only 6 web-based communication tools for patron communication. About 21 universities in India out of 39 are not using any web-based communication platform. Indian universities need to adopt new ways of communication for reaching to patron like Tumblr, Stumbleupon, Flickr, Pinterest, iTunes, Instagram, Delicious, Google+, Foursquare, Whatsapp along with Facebook, Twitter, Email, LinkedIn etc.

Annexure 6.3 shows that which universities uses more web-based communication tools for patron education and which are used very less tools from different regions of the world.

6.2.1.4. WEB-BASED PUBLISHING PLATFORM FOR PATRONS:

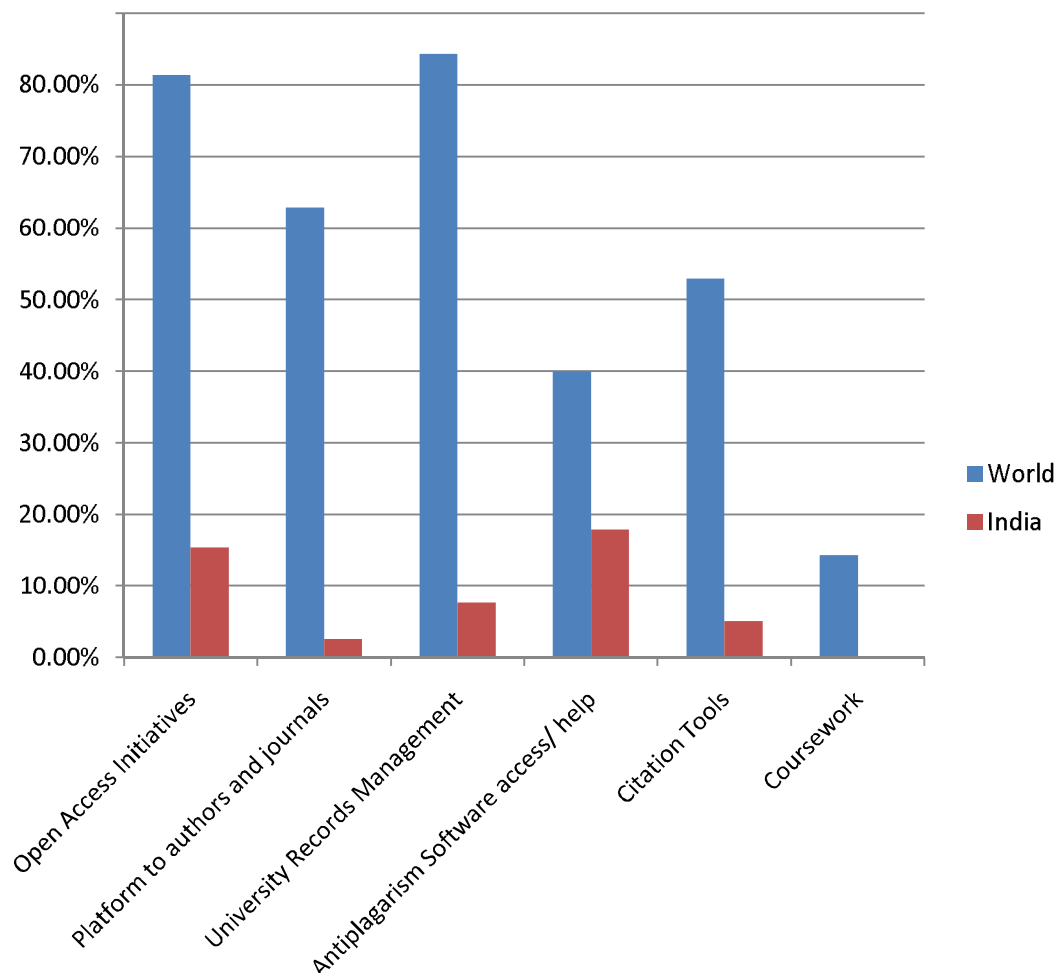
The total percentage scores of the web-based publishing platform for patrons by universities in India and the world are 57.8% at higher side and 9.2% at lower side. The maximum score is for undertaking open access initiatives for University publications and archives and the minimum score is for Course work.

T-Test for comparing the means of these services by world and Indian University libraries showed World University libraries were having total web-based publishing platform for patrons mean of 3.357 (± 1.5883) and that for Indian University libraries, the mean score was 0.487 (± 0.9140). The mean difference between the mean score of web-based publishing platform for patrons offered by 'Indian' and 'World' University libraries was 2.8700. This mean difference was statistically significant at 0.05 significance levels ($t=10.356$, $df=107$). This indicates that, the World University libraries are offering total publishing platform and services for patrons about three times better than Indian University libraries.

From the percentage score (cross tables) and Chi-Square test tables it has been observed that score of the World University libraries taken open access initiatives was 81.4% and of Indian University libraries 15.4%, Publishing platform provided by 62.9% World University libraries and 2.6% Indian University libraries, 84.3% world and 7.7% Indian University libraries keeps and manages university records, 40% world and 17.9% Indian University libraries provides anti-plagiarism software or help, 52.9% world and 5.1% Indian University libraries were proving citation tools or help, 14.3% World University libraries were helping or providing course work for patrons while no Indian University yet started online coursework.

Graph 6.4 is self-explanatory to show the score of each patron publishing platform or help to patrons' area wise.

Graph 6.4 Average score of patron publishing platform and help service of 'World' and 'Indian' university libraries



Out of six services or initiatives by the University libraries all over the world to support publishing and research activity among patrons, the Harvard University from USA, the University of Melbourne from Oceania and the Universidad Nacional de Colombia from Civet are much ahead than other universities from the world who have not yet taken any initiatives in this direction like the Peking University, the Lomonosovthe Moscow State University, the Universidade Federal do Rio de Janeiro, the Cairo University and the Universidad de Puerto Rico (UPR).

From India, the University of Hyderabad, the Maharishi Dayanand University, Rohtak and the Banasthali Vidyapith, Banasthali are using about half of the services to help and provide a platform for patrons to publish their research. Out of 39 Indian

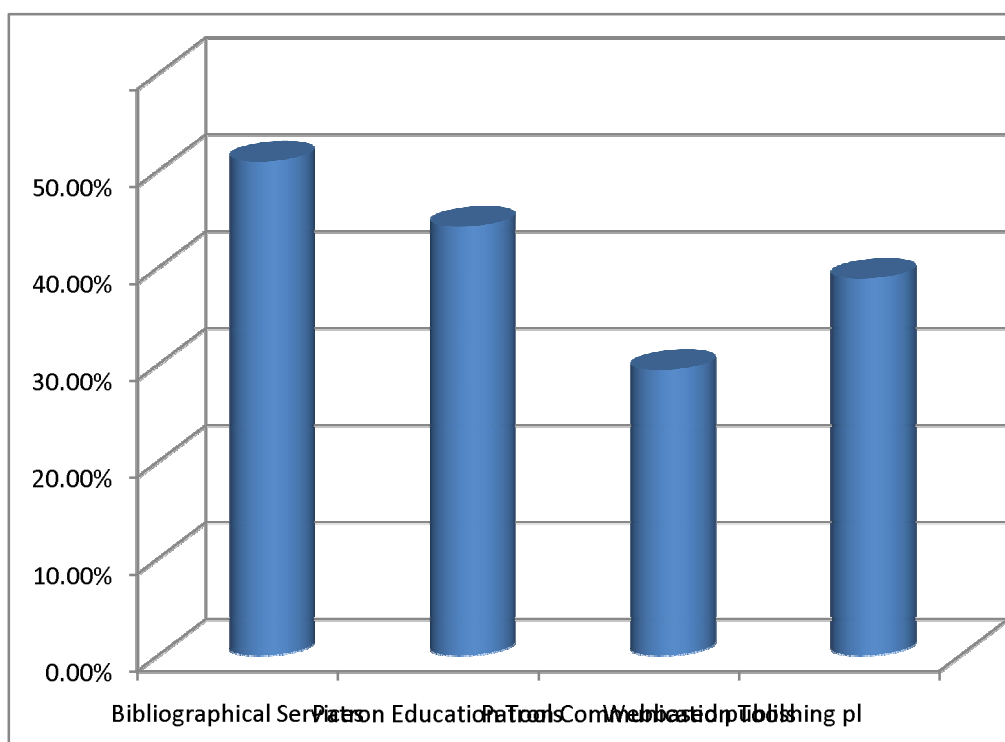
universities about 28 Indian universities are yet to initiate these kinds of activities. As there is no distance learning or flipped or online classes are going on in these university coursework or course related material providing services is not yet initiated in these universities.

Annexure 6.4 shows which universities are much ahead in providing these services and which universities are yet to work hard along with their service score.

6.2.1.5. TOTAL WEB-BASED LIBRARY SERVICES:

Below Graph shows an overall average of web-based services offered by all the ‘World’ and Indian University libraries were 41.53%. An average of the total score of different web-based services offered by all sample ‘World’ and Indian University libraries were for bibliographical services was 50.90%, patron education services score was 44.21%, patron communication tools score was 29.44% and publishing platform and help for patron score was 38.85%.

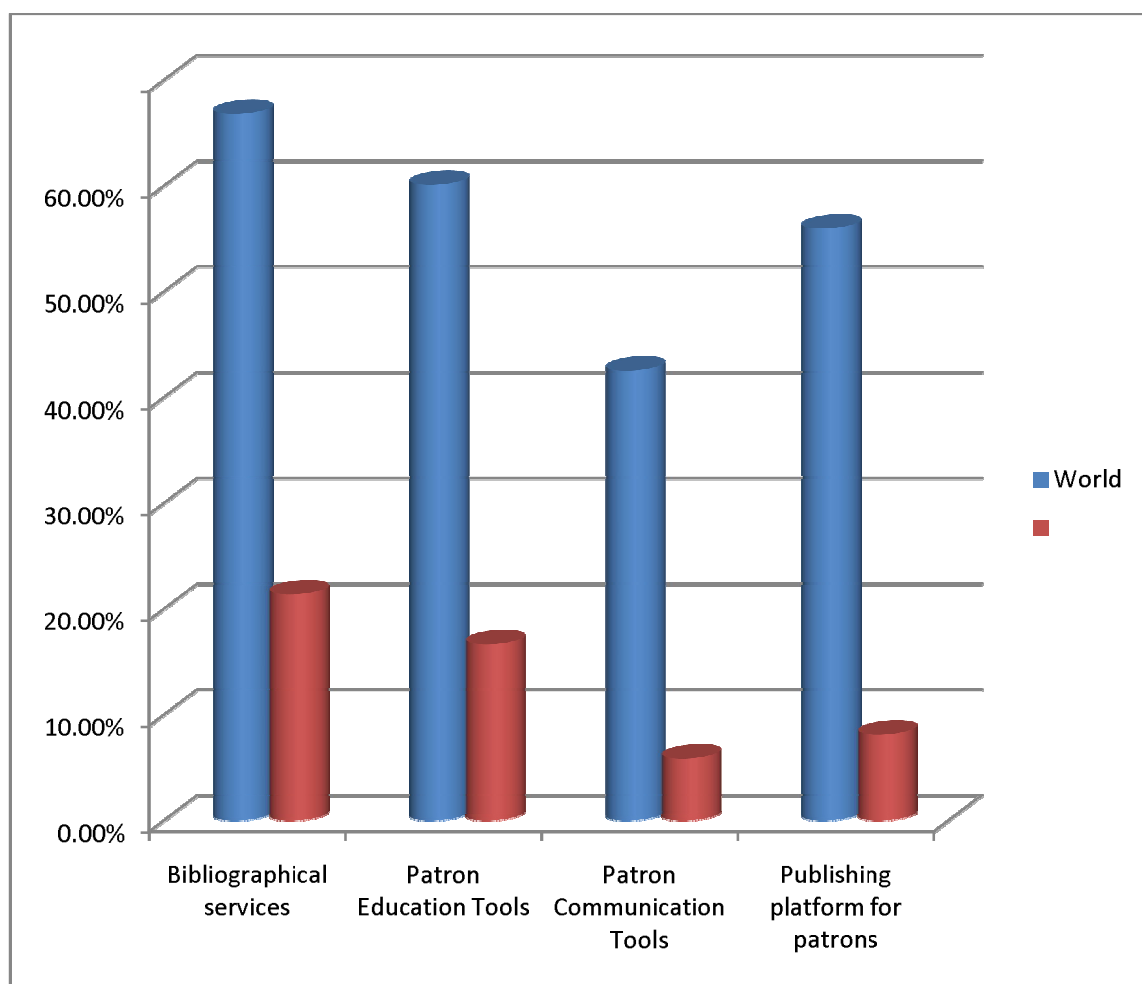
Graph 6.5 Average score of different web-based services of sample university libraries



Comparison of average score of web-based bibliographical services of the World University libraries was 66.81% and of the Indian University libraries 21.39%, patron education services/tools for World University libraries was 60.10% and for Indian University libraries 15.67%, patron communication services for the World University libraries was 42.54% and for Indian University libraries 5.87% and last cluster of publishing platform for patrons service for the World University libraries was 55.97% and for the Indian University libraries was 8.12%. It clearly shows that Indian University libraries are poor in providing web-based services to their patrons.

Below Graph 6.6 shows an overview of all web-based services offered by the world and Indian University libraries.

Graph 6.6 Overview of all services by World and Indian University Libraries



When we consider all web-based services offered by all 109 top World and Indian universities, it has been observed that top five world universities, according to

'Webometric Rankings of Universities', i.e. the Harvard University, the Stanford University, the Cornell University, the University of Michigan and the University of California Berkeley (Avg. 51) are also topper in offering web-based services too. European universities ranked second position (Avg.44.2) and South East Asian universities ranked third position (Avg.40.6) in offering web-based library services. North African universities took the last position in offering web-based library services. In India, the Jawaharlal Nehru University took first position (36) and the Tata Institute of Social Science took second position (30) and the Maharishi Dayanand University, Rohtak took third position (20) in offering web-based library services.

Annexure 6.5 shows the universities from different region of the world offering, maximum and minimum score of web-based services.

6.2.3. WEB-BASED BEST PRACTICES:

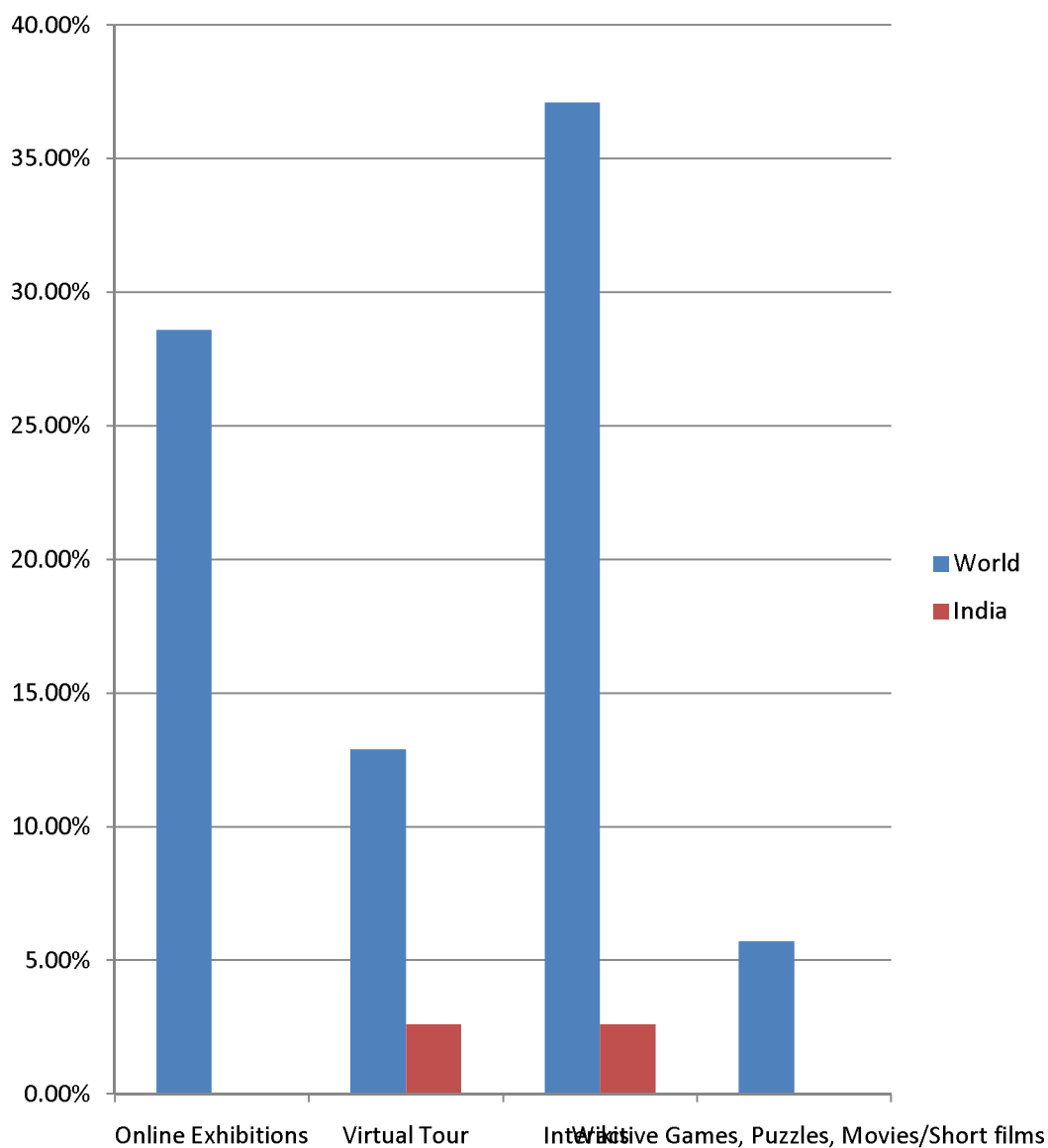
The investigator shortlisted four best practices offered by sample University libraries and found that, 24.8 % University libraries were having their wiki pages and 18.3% libraries were conducted online exhibitions of their collection at a large level, 9.2% libraries were created virtual library tour and only 3.7% libraries were practicing interactive games, quiz, puzzles, movies or short film type activities for their patrons to create interest in this subject or libraries.

The T-test applied to compare all best practices by the World and Indian University libraries score showed that, the World University libraries are offering a total web-based practices mean of 0.843 (± 0.9111) and that for Indian University libraries, the mean score was 0.051(± 0.2235). The mean difference between the mean score of web-based best practices conducted by 'Indian' and 'World' University libraries was 0.7916. This mean difference was not statistically significant at 0.05 significance level ($t=5.327$, $df=107$).

The percentage score of the World University libraries for best practices 'online exhibition' was 28.6% and for Interactive games, puzzles, movie/short films was 3.7% whereas no Indian University libraries were providing these best practices. Virtual tour practiced by 12.9% world and 2.6% Indian University libraries; wikis were created by 37.1% world and 2.6% Indian University libraries.

Below Graph 6.7 is self-explanatory to show the score of the best practices offered by area wise libraries and indicates that, the ‘World’ University libraries are conducting total web-based best practices better than Indian University libraries.

Graph 6.7 Average score of best practices of ‘world’ and ‘Indian’ university libraries



Annexure 6.6 shows that which universities are conducting best practices in their libraries at large scale and which libraries are yet to take such initiatives.

6.2.4 SINGLE WEB PAGE UNIVERSITY LIBRARIES:

In this research, it was found that from India 12 universities had single web pages through which they reach and interact with patrons. They offered hardly 18 web-based services through that webpage. As compared to other World University websites and web-based services offered those by these libraries needed to improve their library website designing to their contents.

6.2.5. CORRELATION OF UNIVERSITY AND LIBRARY RANKINGS:

On the basis of total score of web-based services offered investigator ranked the university libraries and calculated Spearman Correlations between world/India rankings of universities with their library rankings depending on web-based services offered and found that, the world University ranking and library rankings was statistically significant at 0.05 significance level while Indian University library rankings and Indian University rankings according to NAAC (CGPA) score was statistically not significant at 0.05 significance level. In all accreditation systems and ranking of university libraries plays major role in research, infrastructure and facilities criteria. It is observed that, the world University rankings and the University Library Rankings show the Spearman correlation coefficient 0.465 between them and therefore, we can say that while ranking universities at World level library web-based services were taken into consideration and libraries played role in getting university higher rank. In Indian scenario, we found there were no correlation ($p = .215$, $p = .474$) between University Rankings and Library Rankings though NAAC has covered different library services and facilities under criteria IV. This difference between 'World' and 'Indian' universities is maybe because of rankings at the world and country level. Now many discussions going on, why Indian universities are not reflected in top World University ranking? It is observed that in case of world university rankings, their library rankings are also high. Therefore, it is suggested that if Indian University Libraries will offer more various web-based services including research and patron education, communication tools Indian universities will also get higher rankings than present rankings in the world ranking system. Many world University Ranking Systems see the presence of University on the web and Google scholar for their research output and libraries plays major role in initiating open access publishing institutional repository and publications.

6.3. SUGGESTIONS ON WEB-BASED SERVICES AND BEST PRACTICES:

Through this study investigator studied 70 University Libraries spread all over the World evenly and 39 University Libraries spread all over India. From the data analysis, findings and observations there is scope for Indian libraries to improve their web-based services and best practices. Both 'World' and Indian University Libraries average score for a bibliographical service is better compared to all other web-based services. After bibliographical services the score of patron education services was good. Patron communication services are average in both cases and poorly in offering publishing platform and help. As discussed in findings and observations, Indian universities are four times backward in providing different web-based bibliographical services and patron education services and eight times backward in using web 2.0 tools and other web-based communication tools to communicate with patrons. In case of bibliographical services Indian University libraries should give details of library automation, digital library and e-discovery Softwares they are used in their libraries on their website. It is possible that libraries are providing all the bibliographical services within campus or using login passwords, but they failed to mention the details or the path on their library websites. Similarly, it has been found that, many librarians have their social network accounts and actively communicates with patron using various web 2.0 platforms, but they failed to create an account with their university library names. So there is suggestion for Indian University library professionals to run the account with their University or library names.

In this study, many examples of web-based services and practices offered by top world universities are mentioned. Many patron education tools are free of cost and with some initiatives and efforts Indian University libraries can also offer. Libraries all over the world are offering various web based services to the users. Since last one decade, researchers see a huge difference between world and Indian University Library web-based services, but still Indian universities are lagging behind in offering web based services because of various reasons like lack of trained staff to manage these kinds of services, websites are outsourced and lack of knowledge of technologies and tools used behind such services.

Though because of web and new library technologies it has become very easy to reach patrons and provide them resources at their fingertip where ever they are, but due to insufficient trained staff such as web librarians, subject librarians to take care of web-based services Indian libraries are lagging behind. In developed country Libraries there are teams of special librarians are working on library web-based services, website updating and to offer need based services to the patrons. They are ahead of time in using ICT and web communication technologies. Many Indian library staff is interested to offer new services, but still students in India are interested in personalized training and education than offering them online using different web platforms and tools.

Libraries in developed countries are using most of these technologies and are visible on their websites. But in developing and underdeveloped countries, many library professionals are not aware and trained about using these technologies. Library professionals are not aware about what technologies they use behind these services. Here are few new educational technologies and tools investigator suggesting which all libraries can use and implement which are not covered in this study.

Educational Technologies:

The educational technologies nowadays used all over the world in periodic table form which covers social networks, online learning technologies, multimedia technologies, coding technologies, classroom technologies, hardware and educational conferences. (http://www.schrockguide.net/uploads/3/9/2/2/392267/edtech_periodic-table.pdf)

- **Social Networks:** Twitter, Facebook, Edmodo, Slideshare, Google+, Edublogs, Wikispaces, Linkedin, Scoop.it, Pinterest, Grockit, Skype, Diigo, Quora, Ning, Openstudy and Instagram
- **Online Learning technologies:** Khan academy, Animoto, Socrative, Knewton, Kerpoof, StudySync, Udacity, Udemy, Corsera, edX and Skills Genius.
- **Multimedia technologies:** Prezi, Wordle, Quizlet, YouTube, TED-Ed, eduCanon, Evernote, PlanboardandBitstrips
- **Coding technologies:** code.org, Hour of Code, Scratch, Kodable, W3Schools, Code Avengers, Raspberry pi and Minecraft

- **Classroom Technologies:** Doceri, Google Apps, Groupboard, Schoology, ePals, OneNote, edShelf, Book Creator, Canva, Pikochart, iBeacons, WordPress, Popplet, Jing, Stumbleupon, Slack, Camtasia, Videonot.es, LiveBinders, Dropbox, Office 365, QR Codes, Remind, Class messenger, ClassDojo, Kidblog, Showme, iKeepSafe, Mastery Connect, Explain Everything, Skitch, iMovie, Pinkmonkey, Doodle, Storify, Osmo, iRubric and Rubistar
- **Hardware Technologies:** Apple iPad, Chromobook, MacBook, Android, iOS, IWBs and Apple TV.
- **Education Conference:** ISTE, Edcamp, WISE Summit, SXSWedu, ASUGSV, iNACOL, Integrated, FETC, Excel in Ed, Learning and Brain, DML, EdTech Europe, Miami Device, Educon, EdTech Teacher, ASCD, GESF, BETT, Education Innovation Summit, CUE Conf, New Schools, ST4T, Global Educational Conferences, AIEA, EdNET, Learn Launch, OEB and PBL World.

Flipped Classroom for Information Literacy Programs or Patron Education:

Wikispaces Classroom: Wikispaces is an open classroom management platform where teachers and students can communicate and collaborate. It is a social writing platform for education totally free of cost for teachers and students. It provides an easy online platform to create a classroom workspace where you and your students can communicate and work in teams. One can use these Wikispaces classrooms using any modern browser, tablet and phones too. Millions of teachers and students are using this platform for creative and innovative learning. It gives tools for teachers to create assignments, share resources, and make announcements quickly and easily, and foster discussion and community.

Academic libraries can use the Wikispaces classroom for giving library orientation and information literacy programs to all patrons and even for visitors. Basic aims to create flipped classroom is to reach each and every student and with this each student can learn and work wherever and whenever they can? One can embed video tutorials on video of introduction to the library in Wikispaces. Various new educational tools can be used to create this Wikispaces classroom interactive and innovative. To create this flipped classroom following technologies and tools is used.

Thinglink: Thinglink is a leading provider of an interactive images and video interaction tool in the classroom, which can help students develop 21st century skills and enrich their enthusiasm for learning. It works in all modern web browsers as well as iPad, iPhone and Android. One can use tagging platform to layer images and videos with web links, photos, texts, videos, polls, Google products and other great content. Libraries too can use this tool to make their presentations more interactive.

Padlet: Padlet is a digital canvas to create beautiful projects and easiest way to share and collaborate in the world. It is an empty page works like a sheet of paper where you can post or upload whatever you like, whether it is images or snap or selfie or videos or documents or text altogether with anyone from anywhere via device like PC, iPad, phone, etc. It is widely used for teaching, brainstorming, note taking, website publishing, bookmarking, blogging or selling goods. One can make it more beautiful by choosing custom wallpapers and themes given. It is very flexible so it is called as inspiration board. Libraries can use this tool to collect feedback from the patrons in an interactive way.

Screencast-O-Matic: It is a tool to create and share screen recordings. This tool is used by many educators, businesses for fast recording app to create a video file, share on YouTube, or even uploading to a custom branded site. In its free feature, it allows users to record up to 15 minutes on-screen activity for short tutorials, visual presentations, and communicates while you demonstrate and publish on YouTube directly or save as MP4 video file. It supports screen plus webcam recording also. Using this tool libraries can give information literacy training or can demonstrate how to access online electronic resources, OPAC, databases etc.

Rubistar: Is a tool to help the teacher who wants to use rubrics, but does not have the time to create quality rubrics. Rubrics have become popular with teachers as a means of communicating expectations for an assignment, providing focused feedback on works in progress, and grading final products. Rubrics help students to develop understanding and skill and also make dependable judgments about their own work quality. It helps students as well as teachers to clarify the standards for a quality performance and to guide on-going feedback about work in progress. Libraries and

teachers can use this tool for assessing or evaluating the students' assignments too or how much they understand from the lectures.

Jeopardy Labs Game: Jeopardy is danger or risk. Jeopardy is America's favourite game. Jeopardy Labs allow us to build our own jeopardy template without PowerPoint. The games we make can be played online from anywhere in the world. One can create Jeopardy Game of own choice and theme without login also. It is very easy to create the game just by adding titles and categories one needs to add answer and create questions for points given to specific category questions.

Videonot.es: It is an open source tool for taking notes while watching video for future reference. All the notes taken are automatically synchronized with the video and one can just click on a line for the video to jump to the relevant part. We can save or integrate these video notes on Google drive and can access them from anywhere. Once we add videonotes we can share or give permission to a specific group of students or colleagues to view and whenever we want we can make it private.

Libraries can create video notes for the tutorial videos and made them available to the students on the web. To make online learning more interesting libraries can add questions in notes and asked students to answer after watching the video. If students fail to answer they can click on the question and it takes them to the particular strip of video where the answer is there.

edShelf: It is a socially-curated discovery engine of websites, mobile apps, desktop programs, and electronic products for teaching and learning. Anyone can create an account free of cost. For creating a shelf you need to add Title, Description, privacy (Public or Private) and then you can search for tools or websites or programs related to your topic chosen and add the sources in your tray. You can filter the sources by price, platform, subject, age, category and sort by popularity, date added and last update.

Libraries can create edShelfs for specific groups of patrons as per their interest by conducting academic audit and make these shelves available to patrons.

Flubaroo: It is a free, open access tool to create multiple choice based or fill-in-blank type assignments quickly. Teachers need to create an assignment, then create an answer key for the same, then assign and then review the grades. Flubaroo not only used for grading but it can Computes average assignment score, average score per question, flags low-scoring questions, shows a grade distribution graph, gives the option to email each student their grade, and an answer key and let teacher send individualized feedback to each and every student.

Audacity and Vocaroo: Audacity is a free open source digital audio editor and recording computer software application, available for all operating systems, while Vocaroo is a quick and easy way to share voice messages over the interwebs. Audacity is used for post processing of all types of audio including podcasts. We can add effects such as normalization, trimming, fading in and out, srub, cut, copy and paste within limited levels of undo, mix the tracks, noise and vocal reduction and isolation, precise adjustments to the audio speed and pitch and import or export WAV, MP3, AIFF, AC3, AAC, AMR file formats.

Video Ant: It is another web-based video annotation tool for mobile and desktop devices used to add annotations, or comments, to web-hosted videos. VideoAnt-annotated videos are called as “Ants”. To create video ants one need to create a user account and save collections of Ants. Authenticated users can manage their Ant Farm. You can export annotations in various formats. You can embed your ants on website, Wikispaces, LMS or any HTML page.

Voicethread: Voicethread is one of the most diverse communities in the world and that is by design. It is a more human way to connect. One can participate in this using voice, video or text in comment box using any computer, device, internet connection or mobile. We can integrate it in our LMS, ERP, website or HTML pages like Video ant.

Ted-Ed: It is an educational initiative, which aims to amplify the voices and ideas of teachers and students around the world. Any scholar can create worth sharing lesson, new topics and spread their great ideas on this platform to learners. It is a growing library of lessons. It is a good platform for collaborative research. The lessons or educational videos uploaded on the TED platform easily create customized questions and discussions around the video. We can distribute lesson publicly or privately and track its impact on community, students, individuals we shared. Till date 185,903 lessons are created and 10, 183, 478 questions are answered. (28/06/2016, 2.55pm) ed.ted.com

Google Groups: Library professionals can create Google groups for teaching staff and group of students depending on their interests and update them with new information in their interest areas.

Survey Monkey: Libraries can use survey monkey tool to collect online feedback from patrons. It enables to get analyzed report automatically.

6.3.1. SUGGESTIONS FOR FUTURE RESEARCH:

This research was purely on the basis of information collected from the websites, blogs, social media accounts and Google platform. There is further scope of research in which researchers can study various need based information services and collection made available by the university libraries using login and passwords. In this research the information provided on the website is about what services universities offer using patron login passwords. The investigator was unable to login these library account and access information. Therefore, new researcher has scope to study bibliographical and patron education services in depth using login passwords.

In this research the investigator used only quantitative research method, i.e. counting services, no qualitative evaluation of such services. For further research one could envisage evaluating the services also in a qualitative way, which requires a lot of efforts and careful elaboration of criteria.

Many top universities are offering personalized services to their patrons so there is need to study how those librarians offers personalized services using which resources and through which platform. Do they conduct academic audit of patrons and teachers for knowing their information needs? Do they have such Softwares which cater their needs of updating patrons daily in their interest area? Do libraries have collaboration with industries for their unpublished information or gray literature? Another area of research is searching courses offered for library professionals to become web librarians.

In case of Indian University libraries, many libraries are providing various web-based services along with off campus access or within campus using the login and passwords, but they failed to give any details on their website nor it is available on Google too so they scored less. New researchers have scope to visit libraries personally and verify the same.

Many University Rankings are considering research output criteria and facilities provided by universities. A library plays a major role in this and therefore another scope of study for new researchers is to study how these library web based services can help to improve the rankings of universities at global level.

6.4. CONCLUSION:

The main role of any University or academic library is to give maximum information for maximum number of times, by maximum number ways in minimum time. With the changing needs of users and changing educational technologies, increasing use of ICT, Internet and mobile technology university libraries in developed countries are providing their services online and also in person. Many library staff is taking care of patron's needs, those are working or staying at long distance, reaching to each and every student and staff of that university via different media like a website, blog, email, different social networks, OPAC, E-Discovery tools, virtual tour, online exhibitions, research guides etc. They have good ICT team and separate librarians who are working hard to cater needs of users via online media.

Many libraries are making library learning interactive way by organizing special programs, online quizzes, puzzles, and other activities. In this research the investigator tried to cover maximum web-based services and best practices offered by various top world libraries and prepared an inventory of those services. This inventory will help all other University Libraries who are looking to initiate and improve their websites and web-based services.

ANNEXURES

Annexure 1.1

List of sample Universities selected for this Research

Top World University Libraries as per Webometric Ranking						
Sr. No	World Rank	Library Rank	Name of the University	Place/City	Year of Establishment	Library links
WORLD						
1	1	1	Harvard University	Cambridge, MA 02138	1636	http://library.harvard.edu/
2	2	2	Stanford University	Stanford, California 94305	1885	http://library.stanford.edu/
3	3	7	University of California Berkeley	Berkeley, California	1868	http://www.lib.berkeley.edu/node
4	4	3	Cornell University	Ithaca, New York 14853	1865	http://www.cornell.edu/academics/library.cfm
5	5	3	University of Michigan	Ann Arbor, MI 48109-1190	1817	http://www.lib.umich.edu/
BRICS						
6	34	23	Universidade de São Paulo USP	Brazil	1934	http://www5.usp.br/en/pesquisa/biblioteca/
7	47	31	Peking University / 北京大学	Beijing, China 100871	1898	http://eng.lib.pku.edu.cn/
8	49	19	Tsinghua University China / 清	Beijing, 100084 China	1911	http://eng.lib.tsinghua.edu.cn/default.html

				华大学					
9	65	26	14	Zhejiang University (National Che Kiang University) / 浙江大学	Hangzhou, Zhejiang Province, 310058 P. R. China	1897		http://www.zju.edu.cn/english/redir.php?catalog_id=229#49821	
10	83	14	14	Shanghai Jiao Tong University / 上海交通大学	Shanghai, China	1896		http://en.sjtu.edu.cn/about-sjtu/library	
CIVETS									
11	277	26	26	Istanbul University	34452 Beyazit/Fatih-Istanbul	1934		http://kutuphane.istanbul.edu.tr/en/	
12	328	7	7	University of Cape Town	Rondebosch, 7701. South Africa	1905		http://www.uct.ac.za/research/libraries/	
13	462	19	19	Stellenbosch University	Stellenbosch, South Africa	1918		http://library.sun.ac.za/english/Pages/default.aspx	
14	473	12	12	Universidad Nacional de Colombia	Bogotá D.C., Colombia	1967		http://www.sinab.unal.edu.co/	
15	474	27	27	Cairo University	Egypt	1908		http://cu.edu.eg/Libraries	
LATIN AMERICA									
16	56	30	30	Universidad Nacional Autónoma de México	México	1910		http://www.unam.mx/pagina/en/36/teaching-staff-libraries	
17	152	18	18	Universidad de Chile	Santiago de Chile	1842		http://www.uchile.cl/bibliotecas	

18	175	22	Universidade Estadual de Campinas UNICAMP	Campinas, São Paulo, Brasil	1966	http://www.unicamp.br/unicamp/the-unicamp/about-unicamp/libraries-museums?language=en
19	185	23	Universidade Federal do Rio Grande do Sul UFRGS	Av. Paulo Gama, 110 - BairroFarroupilha - Porto Alegre - Rio Grande do Sul, CEP: 90040-060, Brazil	1950	http://www.ufrgs.br/bibliotecacentral/
20	266	35	Universidade Federal do Rio de Janeiro	CidadeUniversitária - Rio de Janeiro, RJ, Brazil	1937	http://www.ufrj.br/
CARIBBEAN						
21	593	20	Universidad de Puerto Rico	Humacao, PR-908, Humacao, 00792	1903	http://www.upr.edu/?type=page&id=biblioteca
22	895	18	University of the West Indies	Mona Campus, Kingston 7, Jamaica	1948	https://www.mona.uwi.edu/library/
23	945	23	Universidad de Puerto Rico Mayaguez	PO BOX 9000, Mayagüez PR 00681-9000	1911	http://www.uprm.edu/library/
24	1680	31	Universidad de la Habana	Havana, Cuba	1728	http://www.uh.cu/Biblioteca-Central
25	1875	17	University of the West Indies at St Augustine	St. Augustine, Trinidad and Tobago	1949	http://sta.uwi.edu/research/index.asp
ASIA/PACIFICO						
26	30	8	National Taiwan University	Roosevelt Rd., Taipei, Taiwan, R.O.C. 106	1928	http://www.lib.ntu.edu.tw/en

27	51	13	Seoul National University / 서울대학교	Gwanak-ro, Gwanak-gu, Seoul, South Korea	1946	http://library.snu.ac.kr/eng/index.ax
28	60	29	University of Tokyo / 東京大学	Tokyo 113-8654, Japan	1877	http://www.lib.u-tokyo.ac.jp/index-e.html
29	82	13	University of Hong Kong	Pok Fu Lam, Hong Kong	1911	http://lib.hku.hk/
30	87	15	Kyoto University / 京都大学	Yoshidahonmachi, Sakyo Ward, Kyoto, Kyoto Prefecture 606-8501, Japan	1897	http://www3.kulib.kyoto-u.ac.jp/guide/eng/guide_en_hours.html
MIDDLE EAST						
31	207	14	Hebrew University of Jerusalem	Jerusalem	1918	http://lib-authority.huji.ac.il/eng/
32	221	15	Tel Aviv University	P.O. Box 39040, Tel Aviv 6997801, Israel	1956	https://english.tau.ac.il/libraries
33	244	18	King Saud University	Saudi Arabia, Riyadh P.O:11362	1957	http://ksu.edu.sa/en/research/library
34	363	34	University of Tehran	16th Azar St., Enghelab Sq., Tehran, Iran	1934	http://ut.ac.ir/en/contents/Overview/Central-Library-Documentation-Center-University-EN/Central.Library.and.Documentation.Center.of.the.University.html
35	583	18	Ben Gurion University of the Negev	SedeBoqer Campus, 8499000 Israel	1969	http://in.bgu.ac.il/en/Pages/libraries.aspx
SOUTH EAST ASIA						

36	116	6	National University of Singapore	21 Lower Kent Ridge Road, Singapore 119077	1905	http://libportal.nus.edu.sg/frontend/index
37	213	17	Kasetsart University	50 Ngam Wong Wan Rd, Lat Yao Chatuchak Bangkok 10900	1943	http://www.lib.ku.ac.th/
38	308	13	Mahidol University	Salaya 73170, Thailand	1943	http://www.li.mahidol.ac.th/
39	420	15	Universiti Putra Malaysia	Selangor, Malaysia	1971	http://www.upm.edu.my/Services/lib
40	480	9	Universiti Sains Malaysia	11800 Gelugor, Penang, Malaysia	1969	http://www.lib.usm.my/
OCEANIA						
41	80	7	University of Melbourne	Victoria 3010	1853	http://library.unimelb.edu.au/
42	85	25	University of New South Wales	NSW 2052 Australia	1949	https://library.unsw.edu.au/
43	92	13	University of Queensland	Brisbane St Lucia, QLD 4072 Australia	1909	https://www.library.uq.edu.au/
44	99	15	Australian National University	Canberra, CRICOS Provider : 00120C	1946	http://anulib.anu.edu.au/
45	114	8	Monash University	Victoria 3800, Australia	1958	http://monash.edu/library/
EUROPE						
46	15	7	University of Cambridge	Cambridge CB2 1TN, United Kingdom	1209	http://www.lib.cam.ac.uk/libraries/

47	16	5	University of Oxford	Oxford, OX1 2JD, United Kingdom	1167	http://www.ox.ac.uk/research/libraries
48	24	4	University College London	Gower Street, London WC1E 6BT	1826	http://www.ucl.ac.uk/library/
49	42	11	University of Helsinki / Helsingin yliopisto	Yliopistonkatu 4, 00100 Helsinki, Finland	1640	http://www.helsinki.fi/kirjasto/en/home/
50	45	16	Utrecht University / Universiteit Utrecht	Postbus 80125, 3508 TC Utrecht, Netherlands	1636	http://www.uu.nl/en/university-library
CENTRAL EASTERN EUROPE						
51	96	24	Charles University in Prague / Univerzita Karlova v Praze	Ovocnýtrh 3-5, Prague 1, Czech Republic	1348	http://www.cuni.cz/UKEN-7.html
52	129	32	Lomonosov Moscow State University / Московский государственный университет М В Ломоносова	Leninskie Gory, Moscow, 119991, Russian Federation	1755	http://www.lib.msu.su/
53	168	20	University of Ljubljana / Univerza v Ljubljani	Kongresni trg 12, 1000 Ljubljana, Slovenia	1919	http://www.unilj.si/study/libraries/university_library_services/
54	170	28	Masaryk University in Brno / Masarykova Univerzita v Brně	Žerotínovonám. 617/9, 601 77 Brno, Czech Republic	1919	http://www.muni.cz/services/library/

55	287	22	Jagiellonian University / Uniwersytet Jagielloński	ul. Gołębia 24, 31-007 Kraków	1364	http://www.en.uj.edu.pl/en/about-university/faculties-and-other-units/libraries
AFRICA						
56	494	8	University of Pretoria	Hatfield, South Africa	1908	http://www.library.up.ac.za/
57	563	17	University of the Witwatersrand	Johannesburg, South Africa	1896	http://www.wits.ac.za/library
58	830	14	University of Kwazulu Natal	King George V Ave, Durban, 4041, South Africa	2004	http://library.ukzn.ac.za/Homepage.aspx
59	855	15	University of Nairobi	Nairobi, Kenya	1956	http://uonlibrary.uonbi.ac.ke/
60	1022	21	University of the Western Cape	Robert Sobukwe Rd, Bellville, Cape Town, 7535, South Africa	1959	http://lib.uwc.ac.za/
NORTH AFRICA						
61	1050	17	American University in Cairo	New Cairo 11835, Egypt	1919	http://library.aucegypt.edu/
62	1167	31	Mansoura University	El Gomhouria St, Mansoura, Dakahlia Governorate 35516, Egypt	1972	http://srv3.eulc.edu.eg/eulc_v5/libraries/start.aspx?fn=Changelang&DefaultLang=En&Applang=E&ScopeID=1
63	1419	32	Benha University	El-Shaheed Farid Nada, Banha, Al Qalyubia Governorate 13511, Egypt	1976	http://www.dgtlib.bu.edu.eg/dgtlib/en/

64	1448	36	Alexandria University	El-Gaish Rd, Egypt	1938	http://www.alexu.edu.eg/index.php/en/library
65	1781	33	Université Djillal Liabes	BP 89 22000 Sidi-Bel-Abbès - Algérie	1989	http://www.univ-sba.dz/biblio/
ARAB_WORLD						
66	780	18	King Abdulaziz University	Abdullah Sulayman St, Jeddah Saudi Arabia	1967	http://library.kau.edu.sa/Default.aspx?site_id=212&lng=EN
67	989	10	American University of Beirut	Beirut, Lebanon	1866	http://www.aub.edu.lb/main/academics/libraries/Pages/index.aspx
68	1061	17	United Arab Emirates University	Sheik Khifa bin Zayed St, Al Near Hospital - United Arab Emirates	1976	http://www.uaeu.ac.ae/en/about/uae_libraries.shtml
69	1263	30	University of Jordan	The University of Jordan, Queen Rania str. • Amman, Jordan	1962	http://library.ju.edu.jo/
70	1350	31	University of Baghdad	Baghdad, Iraq	1957	http://www.clib.uobaghdad.edu.iq/default.aspx
Total Universities from the World :70						

Indian NAAC "A" Grade University Libraries						
Sr No	India Rank	Library Rank	University	Place/City	Year of Establishment	Libray links
			ANDHRA PRADESH			
1	3	3	University of Hyderabad(Central University)	Hyderabad-500 046.	1974	http://igmlnet.uohyd.ac.in:8000/
2	12	9	Konerulakshmaiah Education Foundation (Deemed University)	Greenfields, Kunchanapalli Post, Vaddeswaram, Guntur District, Andhra Pradesh-522502	1980	http://www.kluniversity.in/
3	15	16	Sri Venkateswara University (State University)	Tirupati-517 507. (State University)	1959	http://www.svuniversity.ac.in/Campus/Library.aspx

4	21	18	Sri SathyaSai Institute of Higher Learning, (Deemed University)	Prasanthinilayam, Anantapur-515 134.	1981	http://sssihl.edu.in/
5	24	18	Kakatiya University (State University)	Warangal-506 009	1976	http://www.kakatiya.ac.in/university-library
			HARYANA			
6	9	15	Guru Jambheshwar University of Science and Technology(State University)	Hisar-125 001	1995	http://www.gjust.ac.in/facility/library.html
7	23	4	Maharishi Dayanand University(State University)	Rohtak-124001	1976	http://www.mdurohtak.ac.in/library/ib_libraryprofile.html
			JAMMU & KASHMIR			
8	15	16	Jammu University (State University)	Jammu Tawi-180 006	1969	http://www.jammuuniversity.in/campus_library.asp
9	17	13	Kashmir University (State University)	Srinagar-190 006	1956	http://ail.uok.edu.in/
			KARNATAKA			
10	5	8	Mysore University (State University)	Mysore-570 005	1916	http://www.uni-mysore.ac.in/library/

11	7	18	Jagadguru Sri Shivarathreeswara University (Deemed University)	Jagadguru Dr. Sri ShivarathriRajendraCircle, Ramenuja Road, Mysore – 570 004, Karnataka.	2008	http://www.jssuni.edu.in/facilities/library/
12	12	20	KLE Academy of Higher Education and Research, (Deemed University)	Nehru Nagar, Belagavi, Karnataka 590010	1979	http://www.kleuniversity.edu.in/library/
13	17	19	NITTE University (Deemed University)	Mangalore 575 003, Karnataka.	1999	http://nmamit.nitte.edu.in/?page_id=458
14	24	20	Kannada University (State University)	Hampi, Bellary District, Kamalapura-583 276	1991	http://www.kannadauniversity.org/EN/aboutus.html
			MADHYA PRADESH			
15	19	13	Devi AhilyaVishwavidyalaya, (State University)	Indore-452 001	1964	http://www.dauniv.ac.in/ugcinfonet.php
			MAHARASHTRA			
16	2	2	Tata Institute of Social Sciences (Deemed University)	Deonar, Mumbai-400 080	1936	library.tiss.edu

17	4	12	Indira Gandhi Institute of Development Research (Deemed University)	Mumbai-400065.	1987	http://www.igidr.ac.in/?option=com_content&view=article&id=33&Itemid=65
18	6	18	Padmashree Dr. D.Y. Patil Vidyapeeth (Deemed University)	Navi Mumbai-400706	2002	http://www.dypatil.edu/library/
19	6	17	SYMBIOSIS International University (Deemed University)	Pune-411004.	2002	http://www.siu.edu.in/library.php
20	12	18	Bharati Vidyapeeth, (Deemed University)	Pune-411 030.	1964	http://www.bharatividyapeeth.edu/Students+Corner/Library/index.aspx
			MEGHALAYA			
21	23	6	North Eastern Hill University (Central University)	Shilong-793 022.	1973	http://www.nehu.ac.in/library/index.html
			MIZORAM			
22	16	17	Mizoram University (Central University)	Aizawal-796 012	2001	http://www.mzu.edu.in/index.php/facilities/central-library
			ORISSA			
23	18	19	Shiksha 'O' Anusandhan (Deemed University)	224, Dharmavihar, Khandagiri, Bhubaneswar, Orissa – 751 030	1996	http://www.soauniversity.ac.in/librariy/

24	17	16	RAJASTHAN Jain VishvaBharati Institute, (Deemed University)	Ladnun-341 306.	1991	http://jvbi-koha.informindia.co.in/
25	24	12	BanasthaliVidyapith (Deemed University)	Banasthali-304 022.	1935	http://www.banasthali.org/banasthali/wcms/en/home/library/index.html?jsessionid=89F8CAB195B6520DFF6F8DD9B6DAF9AF
			TAMILNADU			
26	11	17	Alagappa University (State University)	Alagappa Nagar, Karaikudi-630 003	1985	http://alagappauniversity.ac.in/departments/aboutus.php?dept_id=23
27	12	14	Bharathidasan University, (State University)	Tiruchirappalli-620024	1982	http://library.bdu.ac.in/
28	24	14	Bharathiar University (State University)	Coimbatore-641046	1982	http://www.b-u.ac.in/Home/Library
29	24	10	Gandhigram Rural Institute (Deemed University)	Gandhigram-624302.	1956	http://www.ruraluniv.ac.in/facilities?content=library
30	25	15	Avinashilingam Institute for Home Science & Higher Education for Women (Deemed University)	Coimbatore-641 043.	1987	http://www.avinutty.ac.in/library.htm

31	14	7	UTTAR PRADESH	Dayalbagh Educational Institute (Deemed University)	Agra-282 005.	1917	http://www.dei.ac.in/dei/library/
32	15	13		Amity University (Private University)	Sector 125, Noida, Uttar Pradesh 201313	2003	http://www.amity.edu/infra-library.aspx
			WEST BENGAL				
33	8	17		Calcutta University (State University)	Kolkata-700 073	1857	http://www.caluniv.ac.in/libraries/librery.html
			NCT OF DELHI				
34	1	1		Jawaharlal Nehru University (Central University)	New Delhi-110067	1969	http://lib.jnu.ac.in/
35	9	17		TERI School of Advanced Studies (Deemed University)	New Delhi-110 003	1998	http://www.teriuniversity.ac.in/teri-university-library
36	10	14		Rashtriya Sanskrit Sansthana (Deemed University)	JanakPuri, New Delhi-110 058.	1970	sanskritlibraries.nic.in

37	20	9	JamiaHamdard (Deemed University)	New Delhi-110 062	1989	http://www.jamiahamdard.ac.in/LibraryInformationSystem/Library%20Web%20%20site.HTML
38	22	11	Guru Gobind Singh IndraprasthaVishwavidyalaya(State University).	Kashmere Gate, Delhi-110 006	1998	http://www.ipu.ac.in/urc/digital.htm
			PONDICHERRY			
39	13	5	Pondicherry University, (Central University)	Pondicherry-605 014	1985	http://210.212.230.223/
Total Indian Universities: 39						

Annexure 5.1

Ranking of world/India universities and their library rankings as per their library web-based services analyzed.

Area	State	World Ranking	Library Ranking	University Name
World	World	1	1	Harvard University
World	World	2	2	Stanford University
World	World	3	7	University of California Berkeley
World	World	4	3	Cornell University
World	World	5	3	University of Michigan
World	Europe	6	7	University of Cambridge
World	Europe	7	5	University of Oxford
World	Europe	8	4	University College London
World	Asia/Pacifico	9	8	National Taiwan University
World	Brics	10	23	Universidade de São Paulo USP
World	Europe	11	11	University of Helsinki / Helsingin yliopisto
World	Europe	12	16	Utrecht University / Universiteit Utrecht
World	Brics	13	31	Peking University
World	Brics	14	19	Tsinghua University China
World	Asia/Pacifico	15	13	Seoul National University
World	Latin America	16	30	Universidad Nacional Autónoma de México
World	Asia/Pacifico	17	29	University of Tokyo
World	Brics	18	26	Zhejiang University (National Che Kiang University)
World	Oceania	19	7	University of Melbourne
World	Asia/Pacifico	20	13	University of Hong Kong
World	Brics	21	14	Shanghai Jiao Tong University
World	Oceania	22	25	University of New South Wales
World	Asia/Pacifico	23	15	Kyoto University
World	Oceania	24	13	University of Queensland
World	Central Eastern Europe	25	24	Charles University in Prague / Univerzita Karlova v Praze
World	Oceania	26	15	Australian National University
World	Oceania	27	8	Monash University
World	South East Asia	28	6	National University of Singapore
World	Central Eastern Europe	29	32	Lomonosov Moscow State University

World	Latin America	30	18	Universidad de Chile
World	Central Eastern Europe	31	20	University of Ljubljana / Univerza v Ljubljani
World	Central Eastern Europe	32	28	Masaryk University in Brno / Masarykova Univerzita v Brně
World	Latin America	33	22	Universidade Estadual de Campinas UNICAMP
World	Latin America	34	23	Universidade Federal do Rio Grande do Sul UFRGS
World	Middle East	35	14	Hebrew University of Jerusalem
World	South East Asia	36	17	Kasetsart University
World	Middle East	37	15	Tel Aviv University
World	Middle East	38	18	King Saud University
World	Latin America	39	35	Universidade Federal do Rio de Janeiro
World	Civets	40	25	Istanbul University
World	Central Eastern Europe	41	22	Jagiellonian University / Uniwersytet Jagielloński
World	South East Asia	42	13	Mahidol University
World	Civets	43	7	University of Cape Town
World	Middle East	44	34	University of Tehran
World	South East Asia	45	15	Universiti Putra Malaysia
World	Civets	46	19	Stellenbosch University
World	Civets	47	12	Universidad Nacional de Colombia
World	Civets	48	27	Cairo University
World	South East Asia	49	9	Universiti Sains Malaysia
World	Africa	50	8	University of Pretoria
World	Africa	51	17	University of the Witwatersrand
World	Middle East	52	18	Ben Gurion University of the Negev
World	Caribbean	53	20	Universidad de Puerto Rico (UPR)
World	Arab_world	54	18	King Abdulaziz University
World	Africa	55	14	University of Kwazulu Natal
World	Africa	56	15	University of Nairobi
World	Caribbean	57	18	University of the West Indies
World	Caribbean	58	23	Universidad de Puerto Rico Mayaguez
World	Arab_world	59	10	American University of Beirut
World	Africa	60	21	University of the Western Cape

World	North Africa	61	17	American University in Cairo
World	Arab_world	62	17	United Arab Emirates University
World	North Africa	63	31	Mansoura University
World	Arab_world	64	30	University of Jordan
World	Arab_world	65	31	University of Baghdad
World	North Africa	66	32	Benha University
World	North Africa	67	36	Alexandria University
World	Caribbean	68	31	Universidad de la Habana
World	North Africa	69	33	Université Djillali Liabes
World	Caribbean	70	17	University of the West Indies at St Augustine
Area	State	India Ranking	Library Ranking	University Name
India	New Delhi	1	1	Jawaharlal Nehru University
India	Maharashtra	2	2	Tata Institute of Social Sciences
India	Andhra Pradesh	3	3	University of Hyderabad
India	Maharashtra	4	12	Indira Gandhi Institute of Development Research
India	Karnataka	5	8	Mysore University
India	Maharashtra	6	17	Symbiosis International University
India	Maharashtra	6	18	Padmashree Dr. D.Y. Patil Vidyapeeth
India	Karnataka	7	18	Jagadguru Sri Shivarathreeswara University
India	West Bengal	8	17	Calcutta University
India	New Delhi	9	17	TERI School of Advanced Studies
India	Haryana	9	15	Guru Jambheshwar University of Science and Technology
India	New Delhi	10	14	Rashtriya Sanskrit Sansthana
India	Tamil Nadu	11	17	Alagappa University
India	Andhra Pradesh	12	9	KLE Academy of Higher Education and Research
India	Karnataka	12	20	KLEAHER
India	Maharashtra	12	18	Bharati Vidyapeeth
India	Tamil Nadu	12	14	Bharathidasan University
India	Pondicherry	13	5	Pondicherry University
India	Uttar Pradesh	14	7	Dayalbagh Educational Institute
India	Andhra Pradesh	15	16	Sri Venkateswara University
India	Jammu & Kashmir	15	16	Jammu University
India	Uttar Pradesh	15	13	Amity University
India	Mizoram	16	17	Mizoram University
India	Jammu & Kashmir	17	13	Kashmir University

India	Karnataka	17	19	NITTE University
India	Rajasthan	17	16	Jain VishvaBharati Institute
India	Orrisa	18	19	Shiksha 'O' Anusandhan
India	Madhya Pradesh	19	13	Devi AhilyaVishwavidyalaya
India	New Delhi	20	9	JamiaHamdard University
India	Andhra Pradesh	21	18	Sri SathyaSai Institute of Higher Learning, Prasanthinilayam
India	New Delhi	22	11	Guru Gobind Singh IndraprasthaVishwavidyalaya
India	Haryana	23	4	Maharishi Dayanand University
India	Meghalaya	23	6	North Eastern Hill University
India	Andhra Pradesh	24	18	Kakatiya University
India	Karnataka	24	20	Kannada University
India	Rajasthan	24	12	BanasthaliVidyapith
India	Tamil Nadu	24	10	Gandhigram Rural Institute
India	Tamil Nadu	24	14	BharathiyarUniv
India	Tamil Nadu	25	15	Avinashilingam Institute for Home Science and Higher Education for Women

Annexure 6.1

The universities offering maximum and minimum web-based bibliographical services out of total listed area wise

Region	Universities offering maximum bibliographical services	Universities offering minimum bibliographical services
Africa	University of Pretoria(10/12)	University of the Western Cape (6/12)
Arab_world	American University of Beirut (9/12)	University of Jordon(2/12)
Asia/Pacifico	National Taiwan University & Kyoto University(11/12)	University of Tokyo (5/12)
Brics	Tsinghua University and Shanghai Jiao Tong University (10/12)	Universidade de São Paulo (5/12)
Caribbean	University of the West Indies at St Augustine (10/12)	Universidad de la Habana (5/12)
Central Eastern Europe	Jagiellonian University (8/12)	Lomonosov Moscow State University (3/12)
Civets	University of Cape Town and Universidad Nacional de Colombia (11/12)	Cairo University (7/12)
Europe	University College London (11/12)	Utrecht University (7/12)
Latin America	Universidade Estadual de Campinas (8/12)	Universidade Federal do Rio de Janeiro (4/12)
Middle East	Tel Aviv University (10/12)	Univeristy of Tehran (1/12)
North Africa	American University in Cairo (7/12)	Alexandria University (4/12)
Oceania	Australian National University (10/12)	University of New South Wales (6/12)
South East Asia	Mahidol University (11/12)	Universiti Putra Malaysia (7/12)
World	Harvard University (12/12)	University of Michigan (11/12)
India	Jawaharlal Nehru University, New Delhi (10/12)	13 universities does not offer a single bibliographical service

Annexure 6.2

The universities offering maximum and minimum web-based patron education services out of total listed area wise

Region	Universities offering maximum patron education services	Universities offering minimum patron education services
Africa	University of Pretoria (24/27)	University of Nairobi (16/27)
Arab_world	American University of Beirut (20/27)	University of Baghdad (8/27)
Asia/Pacifico	National Taiwan University (21/27)	University of Tokyo (11/27)
Brics	Shanghai Jiao Tong University (20/27)	Peking University (6/27)
Caribbean	Universidad de Puerto Rico (UPR) And University of the West Indies (19/27)	Universidad de la Habana (8/27)
Central Eastern Europe	Charles University in Prague / Univerzita Karlova v Praze (16/27)	Lomonosov Moscow State University (6/27)
Civets	University of Cape Town (23/27)	Cairo University (8/27)
Europe	University College London (24/27)	Utrecht University / Universiteit Utrecht (15/27)
Latin America	Universidad de Chile (18/27)	Universidade Federal do Rio de Janeiro (4/27)
Middle East	Hebrew University of Jerusalem (18/27)	University of Tehran (7/27)
North Africa	American University in Cairo (18/27)	Alexandria University (3/27)
Oceania	University of Melbourne (23/27)	University of New South Wales (15/27)
South East Asia	National University of Singapore (24/27)	Kasetsart University (15/27)
World	Stanford University (26/27)	University of California Berkeley (23/27)
India	Jawaharlal Nehru University, New Delhi (19/27)	KLE Academy of Higher Education and Research and Kannada University (0/27)

Annexure 6.3

The universities offering maximum and minimum web-based patron communication services out of total listed area wise

Region	Universities offering maximum patron communication services	Universities offering minimum patron communication services
Africa	University of Nairobi (8/14)	University of the Western Cape (4/14)
Arab_world	American University of Beirut (9/14)	University of Baghdad (4/14)
Asia/Pacifico	National Taiwan University (9/14)	University of Tokyo (3/14)
Brics	Tsinghua University China (5/14)	Peking University (3/14)
Caribbean	University of the West Indies at St Augustine (7/14)	Universidad de Puerto Rico (UPR) (4/14)
Central Eastern Europe	University of Ljubljana (8/14)	Masaryk University in Brno (3/14)
Civets	University of Cape Town (9/14)	Istanbul University (4/14)
Europe	University of Oxford (12/14)	University of Helsinki (9/14)
Latin America	Universidad de Chile (7/14)	Universidade Federal do Rio de Janeiro (2/14)
Middle East	King Saud University (10/14)	University of Tehran (1/14)
North Africa	American University in Cairo (5/14)	Alexandria University (0/14)
Oceania	Monash University (10/14)	Australian National University (4/14)
South East Asia	National University of Singapore (9/14)	Universiti Putra Malaysia (6/14)
World	Harvard University (12/14)	University of California Berkeley (7/14)
India	Jawaharlal Nehru University, New Delhi (6/14)	21 universities in India (0/14)

Annexure 6.4

The universities providing maximum and minimum web-based publishing platforms for patrons out of total listed area wise

Region	Universities offering maximum publishing platform for patrons	Universities offering minimum publishing platforms for patrons
Africa	University of Nairobi (5/6)	University of the Western Cape (4/6)
Arab_world	American University of Beirut (5/6)	University of Jordan (1/6)
Asia/Pacifico	Seoul National University (5/6)	University of Tokyo (2/6)
Brics	Shanghai Jiao Tong University (5/6)	Peking University (0/6)
Caribbean	University of the West Indies at St Augustine (3/6)	Universidad de Puerto Rico (UPR) (0/6)
Central Eastern Europe	Jagiellonian University / Uniwersytet Jagielloński (4/6)	Lomonosov Moscow State University (0/6)
Civets	Universidad Nacional de Colombia (6/6)	Cairo University (0/6)
Europe	University College London (5/6)	University of Helsinki (4/6)
Latin America	Universidade Federal do Rio Grande do Sul UFRGS (3/6)	Universidade Federal do Rio de Janeiro (0/6)
Middle East	Hebrew University of Jerusalem (4/6)	Univeristy of Tehran (2/6)
North Africa	American University in Cairo (5/6)	Alexandria University (2/6)
Oceania	University of Melbourne (6/6)	University of New South Wales (1/6)
South East Asia	National University of Singapore (4/6)	Kasetsart University (3/6)
World	Harvard University (6/6)	University of California Berkeley (3/6)
India	University of Hyderabad, Maharishi Dayanand University and Banasthali Vidyapith, Banasthali (3/6)	28 universities from India (0/6)

Annexure 6.5

The universities offering maximum and minimum web-based services out of total web-based services area wise

Region	Universities offering maximum web-based services	Universities offering minimum web-based services
Africa	University of Pretoria (45/59)	University of the Western Cape (31/59)
Arab_world	American University of Beirut (43/59)	University of Baghdad (19/59)
Asia/Pacifico	National Taiwan University (45/59)	University of Tokyo (21/59)
Brics	Shanghai Jiao Tong University (38/59)	Peking University (19/59)
Caribbean	University of the West Indies at St Augustine (35/59)	Universidad de la Habana (19/59)
Central Eastern Europe	University of Ljubljana (32/59)	Lomonosov Moscow State University (15/59)
Civets	University of Cape Town (46/59)	Cairo University (23/59)
Europe	University College London (49/59)	Utrecht University / Universiteit Utrecht (36/59)
Latin America	Universidad de Chile (34/59)	Universidade Federal do Rio de Janeiro (10/59)
Middle East	Hebrew University of Jerusalem (38/59)	University of Tehran (11/59)
North Africa	American University in Cairo (35/59)	Alexandria University (9/59)
Oceania	University of Melbourne (46/59)	University of New South Wales (27/59)
South East Asia	National University of Singapore (47/59)	Kasetsart University (35/59)
World	Harvard University (55/59)	University of California Berkeley (46/59)
India	Jawaharlal Nehru University, New Delhi (36/59)	Kannada University and KLE Academy of Higher Education and Research (0/59)

Annexure 6.6

The universities offering maximum and minimum web-based best practices out of total web-based best practices area wise

Region	Universities offering maximum web-based practices	Universities offering minimum web-based practices
Africa	University of Pretoria (2/4)	University of the Witwatersrand (0/4)
Arab_world	American University of Beirut (1/4)	University of Baghdad (0/4)
Asia/Pacifico	University of Hong Kong (1/4)	Seoul National University (0/4)
Brics	Peking University (2/4)	Universidade de São Paulo USP (0/4)
Caribbean	University of the West Indies at St Augustine (2/4)	Universidad de la Habana (0/4)
Central Eastern Europe	Jagiellonian University (2/4)	Lomonosov Moscow State University (0/4)
Civets	Universidad Nacional de Colombia (2/4)	Cairo University (0/4)
Europe	University of Oxford (2/4)	Utrecht University (2/4)
Latin America	Universidade Federal do Rio Grande do Sul UFRGS (1/4)	Universidad Nacional Autónoma de México (0/4)
Middle East	Hebrew University of Jerusalem (1/4)	University of Tehran (0/4)
North Africa	American University in Cairo (1/4)	Alexandria University (0/4)
Oceania	Monash University (2/4)	University of New South Wales (0/4)
South East Asia	Universiti Sains Malaysia (2/4)	Universiti Putra Malaysia (0/4)
World	Harvard University (3/4)	University of California Berkeley (2/4)
India	Mysore University and Tata Institute of Social Sciences, Deonar, Mumbai (1/4)	37 universities offers 0 services

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RESEARCH OUTPUTS

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Paper presented at the International Conferences: 02

1. **Hong Kong: Dhamdhere, S.N.;** Smet, E. D. & Lihitkar, R (2013). ABCD open source software for managing ETD repositories. Paper presented at the 16th International Symposium on Electronic Theses and Dissertations ETD 2013 organized by Hong Kong University Libraries, Hong Kong from 22 to 26 September 2013.
2. **Boston: Dhamdhere, S.N.;** Smet, E. D. (2015). "Study of use of web and cloud technology for providing services and educating patrons by selected top traditional university libraries in USA and India". Paper presented at the Annual International Conference at the Joseph B. Martin Conference Center at Harvard Medical School, Harvard University, 77 Avenue Louis Pasteur, Boston, Massachusetts, from 26 to 30 May 2015.

Papers accepted at the International Conference: 02

1. **Harvard: Dhamdhere, S.N.** (2017). "Universities Should Pay Attention To Improve Their Library Web-Based Services To Place Higher In World Ranking System". Paper accepted for oral presentation at the International Journal of Arts & Sciences' (IJAS) International Conference for Education which will be held at Harvard Medical School, 77 Avenue Louis Pasteur, Boston, Massachusetts. The conference will run from 22 to 26 May 2017.
2. **Cambridge: Dhamdhere, S.N.;** Smet, E. D. & Lihitkar, R (2017). "Ranking of world universities correlates with their library rankings". Paper accepted for oral presentation at **6th International Conference on Educational and Information Technology (ICEIT 2017)** to be held during **March 7-10, 2017 in Cambridge, UK** at **Clare College** is the second oldest of Cambridge's thirty-one colleges organized by American Research Association, USA. The paper will be publishing in one volume of International Journal of Information and Education Technology

(IJIET) (ISSN: 2010-3689) and indexed by EI(INSPEC, IET), Cabell's Directories, DOAJ, Electronic Journals Library, Engineering & Technology Digital Library, EBSCO, Google Scholar, Crossref and ProQuest.

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1. **Dhamdhere, S. N.** (2013). "Cloud Computing and Virtualization Technologies in Libraries." IGI Global, USA, 2014. 1-403. Web. 12 Jun. 2013. ISBN13: 9781466646315| ISBN10: 1466646314| EISBN13: 9781466646322. Doi: 10.4018/978-1-4666-4631-5.
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1. **Dhamdhere, S. N.** (2012). ICT and web technology based innovations in education sector. Turkish Online Journal of Distance Education-TOJDE October 2012 ISSN 1302-6488 Volume: 13 Number: 4 Article 17. pg.256-268.
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