

Empirically Validating a Web Quality Model for Academic Websites Developed in Punjabi and Hindi-A Case Study

Rupinder Pal Kaur, and Vishal Goyal

Abstract— In this research, a systematic and quantitative engineering-based approach is followed by applying well-known international standards and guidelines to develop a quality model to measure external quality for web-sites developed in Punjabi and Hindi of academic domain. The set of these websites have been prepared. Among the four hundred forty nine universities in India, websites of forty nine universities are developed in English and Hindi, websites of three universities are developed in Punjabi and English and remaining all are in English and other regional languages. The model has been empirically validated with a sample of five websites of prestigious academic institutes from India. Correspondingly, the model can be used for websites developed in other languages also. The research is valuable to researchers and practitioners interested in designing, implementing and managing academic websites. Also, analysis and comparisons among web sites of academic domain can be performed in a consistent way.

Keywords— Academic domain, External Quality, Indian Languages, Punjabi and Hindi, Quality model, Universities of India, Websites.

I. INTRODUCTION

OUR dependency on web sites is increasing day by day. But, due to the fast expansion of World Wide Web the quality of web sites is being ignored. The web site developers rapidly develop web sites by ignoring their quality as they have to conform to important timing constraints. Internet users are facing lot of problems as the web sites lack usability, navigability, functionality, accessibility and reliability features. Thus, the main purpose of developing websites is forfeited. The expansion of web sites in Indian languages and their usage in India has led to the need to study the factors affecting the quality of the websites.

Recently, lots of websites are being developed in regional languages so that maximum people are able to access them. Hindi is the national language of India, official language of ten states in India and is approximately the sixth-largest language in the world. Punjabi, the state language of Punjab state in India and the 10th most widely spoken language in the world. Consequently, many websites are being developed in these

Rupinder Pal Kaur is with the Post Graduate Department of Computer Science Sri Guru Gobind Singh College, Chandigarh, India. (phone: +91 9872034262 ; e-mail: rsandhu_18@yahoo.com).

Vishal Goyal is with the Department of Computer Science, Punjabi University, Patiala, India. (e-mail: vishal.pup@gmail.com).

languages and have many users worldwide for different domains like newspaper, government, academic etc. As, their quality is not good and there are no indicators to measure them. So, it is the need of the hour to improve their quality.

Monitoring and measuring the quality of web sites is an important challenge for regulators and policy makers. To measure, evaluate and to control quality, we need some measurable attributes. However, hundreds of attributes have been defined by various researchers for websites developed in English but they have not been standardized yet and no research has been carried out for measuring, evaluating and to control the quality of websites developed in Punjabi and Hindi.

In this research, a systematic and quantitative engineering-based approach is followed to identify the attributes and develop a quality model that effect the external quality for web-sites developed in Punjabi and Hindi. The developed quality model can be used for websites developed in other languages also.

The paper is structured as follows. Following the introduction, related literature is presented and analyzed in Section 2. Section 3, discusses about the data collection. In Section 4, a Quality model has been proposed for websites developed in Punjabi and Hindi of Academic Domain based on ISO/IEC 25010[1]. The proposed quality model has been empirically validated on websites of five prestigious academic institutes. Consequently, Section 5 outlines the strategy and process for testing them. Section 6 discusses about the results and analysis. Finally, Section 7 presents conclusion and future work.

II. RELATED WORK

Luis Olsina and Rossi [2-7] are pioneers in this area. A quality model and an ontology of characteristics was proposed based on ISO 9126[8], that was refined several times. According to them, quality characteristics can be decomposed into multiple levels of sub-characteristics, and finally a sub-characteristic into a set of measurable attributes. The characteristics used are usability, functionality, reliability and efficiency with their sub-characteristics as proposed by Luis Olsina which was implemented in all his research work. It was applied it to the museums domain [9], as well as to academic sites [10] and online shops [11].

Luis Olsina et al. outlined more than a hundred characteristics and attributes for the academic domain websites in order to show the quality. A website Quality Evaluation Method (QEM) was proposed as a useful approach to assess the quality of a website. Six typical internationally or regionally well-known academic sites were selected to carry out the case study embracing regions of four different continents. Three different audiences were analyzed regarding academic visitor profiles: current and prospective students, academic personnel and research sponsors. The aim of their work is basically to show a hierarchical and descriptive specification framework for characteristics, sub-characteristics and attributes regarding the students' view point.

The main aim of the research by Americo et al. [12] was to assess whether a universal web quality model can be built or need to build a domain specific web quality model. Americo et al. analyzed more than sixty automatically collectable quality metrics including forty proposed by other researchers. They selected 111 sites from three application domains i.e. Newspapers, Banks and Airlines. Americo et al. observed that almost half of the automatically collectable quality metrics are domain dependent. Based on their study they planned to refine their website quality model consisting of two parts: one part 'universal' (will include domain independent metrics) and the other customized for a specific domain (will include domain dependent metrics).

Although Americo et al. automate the web site evaluation but the testing is done for external quality only both internal quality and 'quality in use' have been ignored. Though, the 'quality in use' is important for qualitative analysis of websites.

Tripathi et al. [13] presents an evaluation methodology for quality characteristics of e-commerce based web applications. They identified factors, sub-factors and metrics from users point of view. An experiment was conducted to evaluate and validate Indian e-commerce web applications using Logic Scoring Preferences (LSP). They evaluated the quality of Indian e-commerce based web applications. Based on these metrics the ranking can be done, according to their quality. The experiment was conducted by MCA students at Bhopal, India. However, the methodology opted for data collection is not discussed.

Tripathi et al. [14] proposed usability metrics for academic web sites. Tripathi et al. has discussed the usability characteristic as described by ISO 9126 model and various researchers concluded that usability requirements varies for websites of different domains and hence to evaluate usability common set of metrics cannot be used. They modified a model proposed for Luis et al. and identified four characteristics (Global Site Understandability, On-Line Feedback and Help Features, Interface and Aesthetic Features and Miscellaneous Features) further divided into 32 measurable attributes based on their small experiment with the help of students of Master of Computer Applications on 3 Indian Universities. They have not validated these metrics neither theoretically nor empirically. Although, they are planning to conduct a questionnaire based survey for this research.

III. DATA COLLECTION

To get an exact number of websites developed in Punjabi and Hindi of Academic Domain, the set of websites have been prepared for this research (Annexure I). Following assumptions are made during the preparation of set of websites:

- The set of websites for above mentioned domains has been collected between 1st September, 2011 to 30th November 2011.
- Only academic websites in Hindi and Punjabi for the Indian Universities or research centre's who have students enrolled for doctoral programmes are included. The research centre's meant for research only or other academic institutes where there is no enrollment of students although very significant like University Grants Commission are not included as the quality characteristics like functionality, usability differs.

Following observations are made while preparing the set of websites in above mentioned time frame:

- There are four hundred forty nine universities in India. Websites of forty nine universities are developed in Hindi and three in Punjabi. Among them, websites of seven universities did not use Unicode encoding for developing their websites.

Moreover, over the next few years, web sites in these Indian languages are expected to expand and it is necessary to ensure the quality of these websites.

IV. QUALITY MODEL FOR ACADEMIC DOMAIN

Software Engineering has a widely adopted quality model, the ISO/IEC 9126 revised by ISO 25010 and several researchers in Web Engineering have adopted it as a basis for their quality models. In this research also same will be followed. The characteristics Functional Suitability, Reliability, Performance Efficiency, Security and Operability have been considered. Maintainability, Compatibility and Transferability characteristics have not been considered as they affect the internal quality of websites.

As mentioned by Americo et al. [12] the quality indicators are domain dependent and thus the quality model has been developed in two phases: global (domain independent) and domain dependent. Previously, a global web quality model (domain independent) has been developed [15] by the authors of this paper for websites developed in Punjabi and Hindi.

The domain independent quality model developed [15] is represented by hierarchical two-level tree structure which consists of five top-level characteristics i.e. functional suitability, operability, reliability, security and performance efficiency. The model consists of two parts first includes the attributes that are to be tested manually and the other part can be automated. For automated testing five free open source testing tools have been proposed. The model consists of more than hundred attributes that have been defined and a metric is chosen for each indicator. The quality model can be used to measure the external quality and to evaluate and compare the

quality of web-sites developed in Punjabi and Hindi. The model can be implemented for websites developed in other languages also.

Now, in this domain dependent quality model forty one academic domain dependent attributes have been proposed based on the characteristics mentioned in ISO 25010 guidelines. The model consists of the eleven attributes that have been proposed by other researchers [16-35] and thirty new have been proposed. Table I shows the list of the proposed attributes.

TABLE I
ACADEMIC DOMAIN ATTRIBUTES

S. No.	Characteristic	Attribute Name	S. No.	Characteristic	Attribute Name
1	Functional Suitability	Recruitments	4	Functional Suitability	Previous Results
2	Functional Suitability	Academic Calendar	25	Functional Suitability	Prospectus
3	Functional Suitability	Admission Form Online Fill	26	Functional Suitability	Right to Information
4	Functional Suitability	Alumni Details	27	Functional Suitability	Road Map /Directions
5	Functional Suitability	Annual Report	28	Functional Suitability	Student Cultural Information
6	Functional Suitability	Conferences and Workshops	29	Functional Suitability	Student Result
7	Functional Suitability	Course Syllabus	30	Functional Suitability	Student Scholarship
8	Functional Suitability	Courses Eligibility Criteria	31	Functional Suitability	Student Sports Information
9	Functional Suitability	Faculty CV	32	Functional Suitability	Tenders
10	Functional Suitability	Faculty Names List	33	Functional Suitability	TimeTable
11	Functional Suitability	Fees On-Line Information	34	Functional Suitability	University Guest House
12	Functional Suitability	Fees Details	35	Operability	Hostel Number Images
13	Functional Suitability	Financial Estimates	36	Operability	News and Press Releases
14	Functional Suitability	Information Affiliation/ NAAC Accredition	37	Operability	Research Details
15	Functional Suitability	Infrastructure/Library/Laboratory/Workshop Information	38	Operability	Scope-Wise Update Date of the notices
16	Functional Suitability	Library Catalogue Access	39	Operability	Student Hostel Information
17	Functional Suitability	Library Online Books	40	Operability	Student Related Information
18	Functional Suitability	List Affiliated Colleges	41	Operability	Virtual Tour/ Student Oriented Explanatory Help
19	Functional Suitability	Main Building Picture Slideshow			
20	Functional Suitability	Notices Students			
21	Functional Suitability	Placement Companies Visiting			
22	Functional Suitability	Placement Details Previous Years Students			
23	Functional Suitability	Previous Question Papers			

V. WEB TESTING

The quality model developed has been empirically validated on a sample of websites from the data collected, as discussed in Section III. The sample includes the five most prestigious academic institutes from India i.e. All India Institute for Medical Sciences (Delhi), Delhi University (Delhi), Indian Institute of Management (Ahmedabad), Indian Institute of Technology (Bombay) and Punjabi University (Patiala).

The manual testing has been done for the domain independent attributes proposed in the paper [15] and for the academic domain dependent attributes (Table I). The attribute values are interpreted according to the proposed metrics in the proposed quality models. Table II shows a glimpse of the testing of academic domain attributes. Each attribute's maximum value is 1.0 and the metric chosen is in the range from 0.0 to 1.0. Table II shows a glimpse of the testing of academic domain attributes. Adding up all the scores of attributes, the total score has been calculated and percentage has been considered (Table III) accordingly. As, the domain

independent attributes are more in number therefore, they have more weightage.

TABLE II
ACADEMIC DOMAIN TESTING

S.No.	Attribute Name	AIIMS	Delhi University	Punjabi University	IIM Ahmedabad	IIT Bombay
1	Student Hostel Information	0.50	1.00	0.00	1.00	1.00
2	Hostel Number Images	0.50	0.75	0.00	1.00	1.00
3	Research Details	0.50	1.00	1.00	1.00	1.00
4	News and Press Releases	0.00	1.00	1.00	1.00	1.00
5	Placement Companies Visited	0.00	0.50	1.00	0.50	1.00
6	Placement Details Previous Years Students	0.00	0.50	1.00	0.00	1.00
7	Course Syllabus	0.00	1.00	1.00	0.50	1.00
8	Infrastructure/Library/Laboratory /Workshop Information	0.50	1.00	1.00	1.00	1.00
9	Fees On-Line Information	0.00	0.00	0.00	1.00	0.00
10	Admission Form Online Fill	0.00	0.00	1.00	1.00	1.00

VI. RESULTS AND ANALYSIS

As discussed in the testing section, the quality of five websites has been calculated quantitatively and the comparison has been done as shown in Table III. The website of Indian Institute of Management (Ahmedabad) scored the highest among them. Some highlights of the above tested websites are:

- The website of Punjabi University is the only website that provides floating E-keyboard in Punjabi which assists the users to type in Punjabi Further, a Punjabi search engine called 'khoj' has been provided which search for the words typed in Punjabi. Simultaneously a dictionary is provided to find the meaning from English word to Punjabi. In addition to above a translator from Hindi to Punjabi is also available. Above all a very user friendly software tool to learn Punjabi has also been introduced by the University.
- The website of Delhi University has a unique feature to facilitate the blind users under the heading "Equal Opportunity Cell" which reads the text from the screen.

TABLE III
ANALYSIS OF ACADEMIC DOMAIN WEB SITES

Name of the Academic Institution	All India Institute of Medical Sciences	Delhi University	Punjabi University	IIM Ahmedabad	IIT Bombay
Website Link	http://www.aiims.edu	http://www.du.ac.in	http://www.punjabuniversity.ac.in	http://www.iimahd.ernet.in	http://www.iitb.ac.in
Date of Testing	14.07.12	16.12.12	19.12.12	03.01.13	03.01.13
Language	Hindi and English	Hindi and English	Punjabi and English	Hindi and English	Hindi and English
Domain Dependent Score (Out of 41)	20.73%	67.80%	68.29%	84.15%	96.25%
Domain Independent Score (Out of 102)	40.15%	56.73%	43.11%	58.84%	51.77%
Total Score percentage (Out of 143)	34.46%	60.00%	50.54%	66.25%	64.57%
Rank	5	3	4	1	2

VII. CONCLUSION

The major challenge faced in this research is that the web is continually evolving, with ever changing contents, functions and services. Moreover, with time, the importance of characteristics vary e.g. earlier accessibility was considered more important characteristic but now-a-days usability is given more importance. However, the research will be valuable to researchers and practitioners interested in designing, implementing and managing academic websites developed in Punjabi and Hindi as well as in other languages. Also, analysis and comparisons among academic web sites could be performed in a consistent way.

Finally, the proposed quality model can be useful not only as a frame of reference to evaluate existing web sites and fix errors, but also can be helpful in improving their quality through re-engineering.

Now, in the next step the data will be collected for the above mentioned set of websites of academic domain. Subsequently, quality will be measured quantitatively and qualitative analysis will be done.

Subsequently, questionnaires will be prepared to measure 'quality in use' for these websites. A pilot study will be carried out beforehand to validate these questionnaires. They will be filled by different types of users. Each questionnaire's item will be quantified by a metric (regarding the user questionnaire scale). Hence, qualitative analysis will be done for 'quality in use' for these websites.

ACKNOWLEDGMENT

We are very grateful to Dr. Gagandeep Kaur, Asistant Professor, Punjabi University, Patiala for her valuable comments and suggestions for this research.

REFERENCES

- [1] ISO/IEC CD 25010 Software engineering -- Software product Quality Requirements and Evaluation (SQuaRE) -- Quality model and guide,2009.
- [2] Luis Olsino, Gustavo Rossi: Towards Web-Site Quantitative Evaluation: Defining Quality characteristics And Attributes. In: WebNet World Conference on the WWW and Internet(WEBNET), Honolulu, Hawaii, pp.834-839,1999.
- [3] Luis Olsino, L.Mich and R. Sassano: Specifying Quality Requirements for the Web 2.0 Applications. In: 7th International Workshop on Web-Oriented Software Technology, pp. 56-62.New York (2008).
- [4] Philip Lew, Luis Olsina, Pablo Becker, Li Zhung: An Integrated strategy to systematically understand and manage quality in use for web applications: J.Requirements Engineering, DOI 10.1007/s00766-0011-0128-x, August,2011.
- [5] L. Olsina, G.Rossi: A Quantitative Method for Quality Evaluation of Web Sites and Applications. IEEE, Multimedia.vol.9,No.4, pp. 20-29,2002.
- [6] Luis Olsina, Guillermo, Lafuente, Oscar Pastor: Towards a Reusable Repository for Web Metrics. J. Web Engineering, vol. I, No. 061-073, 2002.
- [7] Olsina L: Quantitative Methodology for Evaluation and Comparison of Web Site Quality. Doctoral Thesis (in Spanish), Ciencias Exactas School, UNLP, La Plata, Argentina.2000.
- [8] ISO/IEC 9126: Information technology -Software Product Evaluation - Software Quality Characteristics And Metrics, International Organization for Standardization (ISO/IEC), Geneva ,Switzerland.2001.
- [9] Olsina, L.: Website Quantitative Evaluation and Comparison: a Case Study on Museums. In: Workshop on Software Engineering over the Internet, at International Conference on Software Engineering,Los Angeles, US,1999.
- [10] Olsina, L., Godoy, D; Lafuente, G.J; Rossi, G.: Assessing the Quality of Academic Websites: a Case Study. J. New Review of Hypermedia and Multimedia (NRHM), Taylor Graham Publishers, UK/USA, ISSN 1361-4568, vol. 5, pp.81-103 1999.
- [11] Olsina. L. Lafuente, G.J. Rossi. G: E-commerce Site Evaluation: a Case Study. In: Springer LNCS 1875; 1st International Conference on Electronic Commerce and Web Technologies, UK, pp. 239-252,2000. http://dx.doi.org/10.1007/3-540-44463-7_21
- [12] Americo Rio, Fernando Brito e Abreu: Websites Quality: Does It Depend on the Application Domain? In: Seventh International Conference on the Quality of Information and Communications Technology, Portugal IEEE, pp.493-498, 2010.
- [13] Tripathi Priyanka, M.Kumar and Namia Srivastava: Ranking of Indian E-Commerce Web-Applications by Measuring Quality Factors. In: Ninth ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing IEEE, 2008.
- [14] Tripathi Priyanka, Manju Pandey and Divya Bharti: Towards the Identification of Usability Metrics for Academic Web-Sites.In: Proceedings IEEE Volume2, pp.394-397, 2010.
- [15] Rupinder Pal Kaur, Vishal Goyal, Gagandeep, Web Quality Model for Websites developed in Punjabi and Hindi. J. Journal of Soft Computing and Software Engineering (JSCSE), ISSN: 2251-7545 and DOI 10.7321/jscse. August, 2013.
- [16] Ghazwa Malak: Modelling Web Quality Using a Probablistic Approach: An Empirical Validation, J.ACM Transactions on the Web , vol.4,No.3,Article 9,2010.
- [17] F.J.Dominguez-Mayo, M.J.Escalona, M.Mejias, A.H.Torres: A Quality Model Evaluation Framework for MDWE Methodologies. In: Research Challenges in Information Science - RCIS, IEEE. pp. 495-506, 2010.
- [18] C.Calero, J.Ruiz and M.Piattini: Classifying Web Metrics Using the web quality Model. J.Online Information Review, Emerald group Publishing, vol. 29, pp. 227-248, 2005.
- [19] Oreste Signore: A Comprehensive Model for Web Sites Quality. In: Proceedings of the Seventh IEEE International Symposium on Web site Evolution, WSE, Budapest, Hungary, pp. 30-38, 2005.
- [20] Xiaolei Liu,Zhen Bao, Haitao Liu, Zhenghong Wang: The Quality and Characteristics of leading General Hospitals Websites in China. J. Med Syst 3, pp.1553- 1562, ,2011.
- [21] Zihou Zhou: Evaluating Websites Using a Practical Quality Model, Master in Philosophy Thesis, Software Technology Research Laboratory, De Montfort University, 2009.
- [22] Alvora Rocha: FWebQ-A framework for Websites Quality Evaluation. In: ICDIPC, Part-I, CCIS,188, Springer-Verlag Berlin Heidelberg. pp.61-71, 2011.
- [23] Adriano Bessa Albuquerque , Arnaldo Dias Belechior: E-Commerce Websites: A Qualitative Evaluation. In: The Eleventh International WORLD WIDE WEB Conference, Posters. 2002.
- [24] Oreste Signore: Towards a Quality Model. In: CMG Poland Annual Conference- Warsaw. 2005.
- [25] R.Fitzpatrick: Additional Quality Factors for the World Wide Web. In: The Second World Congress for Software Quality. Yokohama Japan, Union of Japanese Scientists and Engineers (JUSE), 2000.
- [26] Adrian Fernandez, Emilio Insfran, and Silvia Abrahao: Integrating a Usability Model into Model-Driven Web Development Processes. In: WISE 2009, LNCS 5802, Springer, pp. 497-510, 2009.
- [27] Guidelines for Indian Government Websites, <http://web.guidelines.gov.in>. Accessed on December 8th, 2012.
- [28] Olsina ,D.Godoy ,G.J. Lafuente , G.Rossi: Specifying Quality Characteristics and Attributes for Websites. In: First ICSE Workshop on Web, Springer, vol.I pp.266-278, 2001.
- [29] Shazia Arshad and A.Shah: Design Quality Metrics for a web page : A Web Application. J.Pakistan Journal of Agriculture Sciences, vol.44 (4), pp. 621-624, 2007.
- [30] Arno Acharl, Karl W.Wober, and Christian Baueri: An Integrated Approach to Measure Website Effectiveness in the European Hotel Industry. J.Information Technology and Tourism, vol.6, pp.257-271, 2004.
- [31] Adriano Bessa Albuquerque, Arnaldo Dias Belchior:E-Commerce Websites: a Qualitative Evaluation. In: Conference on Software

Engineering and Advanced Applications - EUROMICRO, pp. 294-300,2002.

- [32] Ben Liburne, Prajwol Devkota, Khaled Md. Khan: Measuring Quality Metrics for Web Applications. In: IRMA International Conference, New Orleans, USA. 2004.
- [33] J.Offutt: Quality Attributes of Web Software Applications. J.IEEE Software, IEEE Computer Society Press, pp. 25-32,2002.
- [34] Fathul Wahid: Evaluating Focus and Quality of Indonesian E-Government Websites. In: Seminar National Aplikasi Teknologi Informasi, (SNATI), Yogyakarta,H-39-H43,2008.
- [35] Alexander D.: How accessible are Australian University Web sites? In: Proceedings of AusWeb03, Ninth Australian World Wide Web Conference, pp. 70-82, 2003.

List of Academic Websites in Hindi		
S.No.	Name of the Institute	URL
1	Central University of Karnataka	http://www.cuk.ac.in
2	Central University of Jharkhand, Ranchi	http://www.cuj.ac.in
3	Indian Institute of Information Technology	http://www.iiita.ac.in
4	Indian Institute of Science	http://www.iisc.ernet.in/
5	Indira Gandhi National Tribal University	http://igntunic.in/
6	National Institute of Mental Health and Neuro Sciences	http://www.nimhans.kar.nic.in
7	National Institute of Technology, Hamirpur	http://nith.ac.in
8	Indian Institute of Technology, Patna	http://www.iitp.ac.in
9	University of Hyderabad	http://www.uohyd.ernet.in
10	All India Institute of Medical Sciences	http://www.aiims.edu/j
11	Central university ,Orissa	http://cuorissa.org
12	Central University of Bihar	http://www.cub.ac.in
13	Central University of Gujarat	http://www.cug.ac.in
14	Central University of Haryana	http://www.cuharyana.org
15	Central University of Rajasthan	http://www.curai.ac.in
16	Delhi University	http://www.du.ac.in
17	Dr. B.R. Ambedkar,NIT Jalandhar	http://www.nitj.ac.in
18	Guru Ghasidas Vishwavidyalaya, Bilaspur	http://www.ggu.ac.in
19	IIM Ahmedabad	http://www.iimahd.ernet.in
20	IIM Kashipur	http://www.iimkashipur.ac.in
21	IIM Bangalore	http://www.iimb.ernet.in
22	IIT Bombay	http://www.iitb.ac.in
23	IIT Kanpur	http://www.iitk.ac.in
24	IIT Kharagpur	http://www.iitkgp.ac.in
25	IIT Roorkee	http://www.iitr.ac.in
26	Indian Agricultural Research Institute	http://www.arires.in
27	Indian Council of forestry research and Education, Dehradun	http://hindi.icfre.org
28	Indian Institute of Foreign Trade	http://www.iift.edu
29	Indian Institute of Technology, Ropar	http://www.iitr.ac.in/
30	Institute of Microbial Technology	http://www.imtech.res.in
31	JagadGuru Ramanandacharya Rajasthan Sanskrit University	http://www.jrsanskrituniversity.ac.in
32	Jawaharlal Nehru Centre for Advanced Scientific Research	http://www.jncasr.ac.in

33	Jawahar Lal University	http://www.jlu.ac.in
34	Jawaharlal Institute of Postgraduate Medical Education & Research	http://www.jipmer.edu
35	Lakshmi Bai National Institute of Physical Education	http://lnipe.nic.in
36	Mahatma Gandhi Antarrashtriya Hindi Vishwavidyalaya	http://www.hindivishwa.org
37	Maulana Azad National Institute of Technology, Bhopal	http://hindi.manit.ac.in
38	National Dairy Research Institute	http://www.ndri.res.in
39	National Institute of Fashion Technology	http://www.nift.ac.in

40	Indian Institutes of Science Education and Research	http://www.iiser Mohali.ac.in
41	NIT Rourkela	http://nitroukela
42	PDPM Indian Institute of Information Technology, Design & Manufacturing	http://www.iiitdmj.ac.in
43	Ramakrishna Mission Vivekananda University	http://www.rkmvu.ac.in

List Of Academic Websites in Hindi		
S.No	Name of the Institute	URL
44	Rashtriya Sanskrit Sanshan	http://www.sanskrit.nic.in
45	School of Planning and Architecture, New Delhi	http://www.spa.ac.in
46	Shri Lal Bahadur Shastri Rashtriya Sanskrit Vidyapeetha	http://www.slbsrsv.ac.in
47	Sikkim University,Tadong	http://www.sikkimuniversity.in
48	University of Solapur	http://su.digitahuniversity.ac/
49	Vivekanandaya National Institute of Technology	http://vnit.ac.in

List of Academic Websites in Punjabi		
S.No	Name of the Institute	URL
1	Panjabi University	http://punjabuniversity.ac.in
2	Baba Farid University of health Sciences	http://bfuhs.ac.in/
3	Panjab Agricultural University	http://web.pau.edu