



THE INFLUENCE OF TEXT STATISTICS AND READABILITY INDICES ON MEASURING UNIVERSITY WEBSITES

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Abstract: In this competitive world, websites are considered to be key trait of any organization's effectiveness. An Institution website is a gateway to its statistics, products and services. The usability is very important feature of individual website to existence in digital setting for each institution. The different factors to measure Usability are Readability, Navigation, Structure, Organization and Content, Search and Retrieval, and Satisfaction. But in previous research to measure the website built on Readability aspect and the average grade of country grading system based on readability indices was somewhere missing. To address this issue, the aim of this paper is to evaluate the Readability indices and Text statistics of twenty-four websites of universities in Punjab. The Readability content of the websites' is measured with six diverse indices such as, Flesch Reading Ease formula, Flesch Kincaid Grade Level Index, Gunning Fog Index, SMOG, Coleman Liau and Automated Readability Index and finally concluded with the analysis of websites against their readability indices.

Keywords: readability; readability indices; grade; usability; ranking; complexity; quality; ranking

1. INTRODUCTION

The World Wide Web (WWW) has turn out to be acrucial tool for information consumption. The web developers have long been worried about the language complexity and its influence on data quality. To measure the readability of website to produce the web search result ranking is a major concern in this paper. Some readability metrics have been engaged to evaluate the usability of websites [1]. Readability marks the quality of printed text easy or hard to read and understand. The handling of data provides information and the information is beneficial only when we can make intellect of it. For the reason that, readability examination for web pages turn into a vital task to sort the contents easily consumed by several types of users [2]. When the content is readable, it's easier to consume. If usability and UX (User eXperience) is important, then readability should be a top priority.

The overall goal of this paper is to find the readability status of twenty-four websites of Universities in Punjab by using Readability evaluation tools.

The rest of the paper is arranged as follows: The related work is presented in Section 2, with particularly focus on the readability metrics to evaluate the website's text, Section 3 introduces the readability formulae's to evaluate the readability of website's content. Section 4, presented the results of readability factor for various universities of Punjab. Section 5 concludes the paper with a viewpoint at future work.

2. RELATED WORK

The readability of websites is taken as major consideration in this paper. An evaluation of Universities of Punjab is evaluated. This section listed a number of studies significant to this paper.

Misra et al. (2013) used the standard readability formulas in diverse fields like industry, training, engineering, military etc. Researchers have accomplished the readability valuation of 17 health care-oriented tutoring resources by using Readability Studio Professional (version 2012.1) tool [3].

Yamasaki et al. (2014) finalized the cross validation experiment to catch the performance of readability scheme for web document [4].

Kumar et al. (2016) considered the readability metrics from patient education materials (PEM) with TextStat 0.1.4 textual analysis package for Python 2.7 [5].

Collin et al. (2014) implemented the assessment on Computational evaluation of text readability to foretell the text difficulty and innovativetask and opportunities' for upcoming investigation were also prepared [6].

Sato et al. (2008) used the technique of readability in Japanese writings to measure the performance of correlation coefficient built on textbook [7].

Kauchak et al. (2016) work was showed to inspect the current readability formulas and support to design operational text simplification software related to health [8].

Dubay (2008) presented the essential theories around readability and the procedure used to check readability in his book entitled "Smart Language". This volume also refer to

the computational method and arranging of texts on the basis of readability score [9].

3. READABILITY DEFINITIONS

According to Edgar Dale and Jeanne Chall (1949) [10], “Readability is the amount of all those elements inside a given piece of printed material that marks the success, which a set of readers have with it. The success is the degree to which they comprehend it, read it at the best speed, and find it interesting” [9]. Alternative definition is given by George Klare (1963) that “the easiness of understanding or comprehension due to the style of Writing” [9]. Gretchen Hargis and her Colleagues at IBM (1998) state that Readability is defined as the “simplicity of reading words and sentences” [9]. Harry McLaughlin (1969) [13]- the creator of SMOG readability formula [9] defines the readability as “the degree to which a certain course of individuals find assured reading material compelling and understandable.” So, this definition emphasizes the collaboration concerning the text and the readers of recognized levels of skill, knowledge, and interest. There are two suppliers specifically the reader and the text, too easy reading. The structures comprise earlier data, reading ability, concern, encouragement, satisfied, style, enterprise, and organization etc., of the script that marks reading easy. So, Readability is the simplicity of reading in relations of above types.

3.1 Readability Formulae

A readability index is an amount to direct the density of written text. Comparatively often they are concentrated on simple features, for instance sentence and word length, and identify how easy it is to read and figure out a text. There are many readability formulas which are used for determining the readability of content.

1. Flesch Kincaid Reading Ease (FKRE): The Flesch Kincaid Reading Ease (FKRE) index [8] is a extended recognized index in this framework. The score of FKRE typically ranges amongst 0 and 100. A higher score designates a text that is easier to read and understand. Low scores recommend the text is complicated to comprehend. The Flesch Kincaid Reading Ease is defined as:

$$206.835 - 1.015 \times \left(\frac{\text{number of words}}{\text{number of sentences}} \right) - 84.6 \times \left(\frac{\text{number of syllables}}{\text{number of words}} \right) \quad (1)$$

A syllable is the sound of a vowel (A, E, I, O, U) that is created when pronouncing the letters A, E, I, O, U, or Y and sentences is a combination of words.

A value between 60 and 80 should be easy for a 12 to 15 year old to understand. The overall summary of Understanding status of script by Flesch Kincaid Readability Ease (FKR) formula is shown in Table 1.

Table 1: Status of Readability Score of FKRE [8]

Readability Score	Status
90-100	Very Easy
80-90	Easy
70-80	Fairly Easy
60-70	Normal
50-60	Fairly Difficult
30-50	Difficult
0-30	Very Difficult

2. Flesch Kincaid Grade Level (FKG): This readability index associates the readability of the text to the US schools grade. The FKG is defined as:

$$0.39 \times \left(\frac{\text{number of words}}{\text{number of sentences}} \right) + 11.8 \times \left(\frac{\text{number of syllables}}{\text{number of words}} \right) - 15.59 \quad (2)$$

This formula is reorganized version of Flesch Reading Ease formula and is commonly used in the area of education. The Defence department of US Government uses this formula as a standard test.

3. Gunning Fog Score (GF Score): It is also called Fog Index and is similar to Flesch scale. The best score of this index is 7 or 8 and whatsoever above 12 is moreover hard to read. That is, in over-all, score 5 is readable, 10 is hard, 15 is difficult and 20 is very difficult to understand the text. The Gunning fog index is defined as:

$$0.4 \times \left(\left(\frac{\text{number of words}}{\text{number of sentences}} \right) + 100 \times \left(\frac{\text{number of complex words}}{\text{number of words}} \right) \right) \quad (3)$$

The original Gunning fog formula was built on clauses and not on the total of sentences. This rendered the Gunning fog too challenging to be calculated automatically. Thus, the formulation offered in equation (3) is largely suggested.

4. SMOG Index: The SMOG is an acronym for Simple Measure of Gobbledygook and its formulation is measured suitable for secondary age students that is, 4th grade to college level readers. McLaughlin [13] presented a different factor in his readability formula: the amount of polysyllables. A polysyllable is a term made of three or further syllables. The SMOG grading index is well-defined as:

$$1.0430 \times \sqrt{\frac{30 \times \text{complex words}}{\text{sentences}}} + 3.1291 \quad (4)$$

5. Coleman Liau Index: It is constructed on characters instead of syllables per word and sentence length. It also practices US grade based formula to recognize the text. The Coleman Liau Index is defined as:

$$5.89 \times \left(\frac{\text{no. of characters}}{\text{no. of words}} \right) - 0.3 \times \left(\frac{\text{no. of sentences}}{\text{no. of words}} \right) - 15.8 \quad (5)$$

6. Automated Readability Index (ARI): It is derived from the fractions representing word difficulty and

sentence difficultly. The Automated Readability Index is defined as:

$$4.71 \times \left(\frac{\text{no.ofcharacters}}{\text{no.ofwords}} \right) + 0.5 \times \left(\frac{\text{no.ofwords}}{\text{no.ofsentences}} \right) - 21.43 \tag{6}$$

ARI provides number as output that estimates the age required to understand or comprehend the text and is furthermore centered on US grading level system as shown in Table 2.

Table 2: Grade Levels Age

Age	Grade
5-6 old	Kindergarten
6-7 old	First
7-8 old	Second
8-9 old	Third
9-10 old	Fourth
10-11 old	Fifth
11-12 old	Sixth
12-13 old	Seventh
13-14 old	Eighth
14-15 old	Ninth
15-16 old	Ten
16-17 old	Eleven
17-18 old	Twelvth
18-22 old	College

Coleman Liau and ARI rely on counting characters, words and sentence. The other indices consider number of syllables and complex words. These all Readability formulas involve two measurable aspects of a text such as, word length and sentence length and a weighted combination of both aspects.

4. READABILITY TOOL AND ANALYSIS OF WEBSITES

There are numerous online Readability score calculation tools available. Designed for analysis, in this paper, the subsequent methods which are established on the collection of readability score calculation tools are used.

1. Online-Utility.org: It is a group of free readability score calculation tool. The tool is based on four methods of readability in terms of US grade level to understand the text, these are involved Coleman Liau index, Flesh Kincaid Grade level, ARI (Automated Readability Index) and SMOG (Simple Measure of Gobbledygook). This online-utility.org (OnlineUtility) also consist of Gunning Fog Index that offers the sign of the number of years of formal education that a person needs in order to easily understand the text on the first reading. It also shows the recommendations of complex sentences in order to do enhancement in readability.

2. Readability Test Tool: This tool (Webpagefx) is accessible online to check the readability of web pages by three dissimilar ways specifically Test by URL, Test by Direct Input or Test by Referrer. To perform analysis on websites, we use Test by URL method for twenty-four websites of Universities in Punjab to measure the readability estimation score by different readability indices techniques.

In this research work, **Readability Test Tool using Webpagefx tool** is opted which covers six readability measures to evaluate the website whereas Online-Utility.org covers only four measures of readability. The Universities of Punjab websites which are evaluated to measure the readability is listed in Table 3 and Collection of URL of the website and passed it into a Webpagefx Tool snapshot is shown in Figure 1.

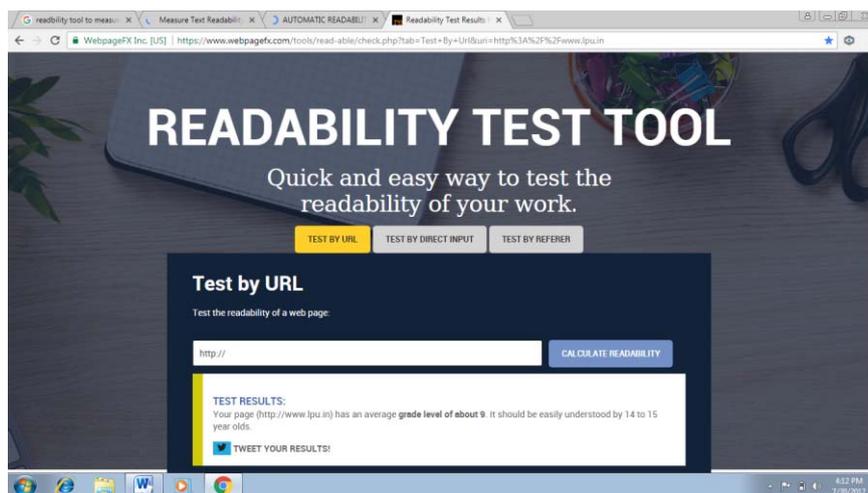


Figure 1: Snapshot of Webpagefx Tool

Table 3: List of Twenty-four websites of Universities in Punjab

S.No.	URLs	Name of Website	Symbol
1.	www.ptu.ac.in	I.K.Gujral Punjab Technical University, Kapurthala	U1
2.	www.lpu.in	Lovely Professional University, Phagwara	U2
3.	www.punjabiversity.ac.in	Punjab University, Patiala	U3
4.	www.thapar.edu	Thapar Institute of Engineering and Technology, Patiala	U4
5.	www.cup.ac.in	Central University of Punjab, Bathinda	U5
6.	www.sliet.ac.in	SantLongowal Institute of Engineering and Technology, Sangrur	U6
7.	www.davuniversity.org	DAV University, Jalandhar	U7
8.	www.pau.edu	Punjab Agriculture University, Ludhiana	U8
9.	www.iitrpr.ac.in	Indian Institute of Technology Ropar	U9
10.	www.puchd.ac.in	Punjab University, Chandigarh	U10
11.	www.bfuhs.ac.in	Baba Farid University of Health Sciences, Faridkot	U11
12.	www.gadvasu.in	Guru AngadDev Veterinary & Animal Sciences University, Ludhiana	U12
13.	www.pec.ac.in	PEC University, Chandigarh	U13
14.	www.ctuniversity.in	C.T.University, Jalandhar	U14
15.	www.gurukashi.in	Guru Kashi University, Talwandi Sabo, Bathinda	U15
16.	www.auts.ac.in	Akal University Talwandi Sabo, Bathinda	U16
17.	www.gnauniversity.edu.in	GNA University, Phagwara	U17
18.	www.mrsphr.ac.in	Maharaja Ranjit Singh Punjab Technical University, Bathinda	U18
19.	www.chitkara.edu.in	Chitkara University, Chandigarh	U19
20.	www.rimt.ac.in	RIMT, Mandi Gobindgarh	U20
21.	www.rayatbahra.edu.in	RayatBahra University, Kharar	U21
22.	www.iimamritsar.ac.in	IIM, Amritsar	U22
23.	www.adeshuniversity.ac.in	Adesh University, Bathinda	U23
24.	www.gndu.ac.in	Guru Nanak Dev University, Amritsar	U24

The procedure of readability test tool (Webpagefx) [14] contains the resulting steps:

1. Pass URL of the website in a given tool and then start the method of testing.
2. Testing total amount of sentences, words, complex words, the percentage of complex words, average words per sentence, and average syllables per word.
3. At that point, testing comprises the subsequent metrics to calculate the readability score separately.
 - Flesh Kincaid Reading Ease
 - Flesh Kincaid Grade Level
 - Gunning Fog Score
 - SMOG Index

- Coleman Liau Index
- Automated Readability Index

4. Based on step 2 and 3, average grade level and a sum of years from the past to apprehend the text of the web pages as per US Grade system, is obtained.

The Webpagefx tool calculates Readability indices and Text statistics of website.

4.1 Readability indices: The estimation report of readability indices method is displayed in Table 4 which is used for twenty-four University websites of Punjab to check their readability estimation score.

Table 4: Readability indices of Twenty-four websites of Universities in Punjab

S.No.	URLs	FKRE	FKG	GF	SMOG	CL	AR
U1	www.ptu.ac.in	45	9.5	6.6	8.7	12.3	6.1
U2	www.lpu.in	49.3	8.1	6.8	7.1	15	6.6
U3*	www.punjabiversity.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U4	www.thapar.edu	23.7	11	7.3	6.9	19.3	8.8
U5*	www.cup.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U6	www.sliet.ac.in	40.1	8.5	4.1	5.8	15.4	5.3
U7	www.davuniversity.org	43.7	8	5.6	5.7	13.3	3.6
U8	www.pau.edu	47.4	8	3.9	6.8	11.8	3.4
U9	www.iitrpr.ac.in	15.8	11.8	7.4	6.1	21.6	10
U10	www.puchd.ac.in	40.8	8.9	5.9	6.9	14.3	5.3
U11*	www.bfuhs.ac.in	18.4	15.4	7.6	11.6	20.5	17.1
U12	www.gadvasu.in	43.5	8.7	5.2	7.7	14.1	5.6
U13	www.pec.ac.in	18.3	11.8	6.5	7	21.3	10.5
U14	www.ctuniversity.in	50.2	7.6	6.2	6.4	15	5.9

U15*	www.gurukashiuniversity.in	77.9	2.9	0.8	1.8	6.1	-2.8
U16	www.auts.ac.in	37.4	8.7	7.1	5.5	15.9	5.4
U17	www.gnauniversity.edu.in	38.1	9.4	7.7	7.5	15.9	7
U18	www.mrsphr.ac.in	36.5	11	7.1	10.1	14.7	8.7
U19	www.chitkara.edu.in	34.1	9.7	5.7	7	16.2	6.6
U20	www.rimt.ac.in	36.3	9.8	8.5	7.8	17	8.1
U21	www.rayatbahra.edu.in	36.8	9	7.4	5.8	16.8	6.5
U22	www.iimamritsar.ac.in	49.2	7.8	5.1	7	13.3	4.6
U23	www.adeshuniversity.ac.in	22.2	10.8	3.8	5.5	21.1	9.5
U24	www.web.gndu.ac.in	42.8	8.4	5.4	6.2	15.4	5.8

* means regional fonts are used in website

4.2 Text Statistics: This statistics is responsible for comprehensive information about the text inside the websites which were evaluated by using different indices in terms of their readability to find a number of sentences, words, complex words, and percent of complex words, average words per sentences and average syllables per word.

Also, there are some indices like Coleman Liau and Automated Readability Index (ARI) built on counting the characters, words and sentences, and some other based on a number of syllables and complex words. The general text statistics of twenty-four websites of Universities in Punjab are shown in Table 5.

Table 5: Text Statistics of Twenty-four websites of Universities of Punjab

S.No.	URLs	No. of sentences	No. of words	No. of complex words	% of complex words	Average words/sentences	Average syllables/words
U1	www.ptu.ac.in	125	1056	214	20.27	10.15	1.76
U2	www.lpu.in	532	2950	569	19.29	6.83	1.75
U3 ^x	www.punjabiuniversity.ac.in	1	1	0	0	1	1
U4	www.thapar.edu	181	643	160	24.88	4.29	1.98
U5 ^x	www.cup.ac.in	1	1	0	0	1	1
U6	www.sliet.ac.in	156	461	108	23.43	3.38	1.87
U7	www.davuniversity.org	318	1049	277	26.41	3.35	1.89
U8	www.pau.edu	202	1012	227	22.43	5.45	1.79
U9	www.iitrpr.ac.in	95	267	97	36.33	2.87	2.22
U10	www.puchd.ac.in	100	522	129	24.71	5.40	1.89
U11 ^x	www.bfuhs.ac.in	1	19	4	21.05	19	2
U12	www.gadvasu.in	368	2042	506	24.78	6.18	1.80
U13	www.pec.ac.in	153	605	182	30.08	4.37	2.13
U14	www.ctuniversity.in	134	698	154	22.06	5.21	1.79
U15 ^x	www.gurukashiuniversity.in	2	4	0	0	2.0	1.50
U16	www.auts.ac.in	460	1036	235	22.68	2.76	1.87
U17	www.gnauniversity.edu.in	337	1748	441	25.23	6.06	1.91
U18	www.mrsphr.ac.in	238	2653	697	26.27	11.50	1.87
U19	www.chitkara.edu.in	617	2346	552	23.52	4.84	1.89
U20	www.rimt.ac.in	195	1239	335	27.04	6.49	1.94
U21	www.rayatbahra.edu.in	274	979	253	25.84	3.57	1.97
U22	www.iimamritsar.ac.in	60	331	85	25.68	5.52	1.80
U23	www.adeshuniversity.ac.in	53	113	31	27.43	2.54	2.13
U24	www.web.gndu.ac.in	321	1412	347	24.58	4.40	1.89

^x means regional fonts are used in website

From tables Table 4 and Table 5, the average and no. of age to understand the text of web pages as per US Grade system is shown in Table 6.

Table 6: Average Grade Level Test Results of 24 Websites of Universities of Punjab

S.No.	URLs	Average Grade Level	No. of Years old to easily understand
U1	www.ptu.ac.in	9	14 to 15
U2	www.lpu.in	9	14 to 15
U3*	www.punjabiversity.ac.in	-8	-3 to -2
U4	www.thapar.edu	11	16 to 17
U5*	www.cup.ac.in	-8	-3 to -2
U6	www.sliet.ac.in	8	13 to 14
U7	www.davuniversity.org	7	12 to 13
U8	www.pau.edu	7	12 to 13
U9	www.iitrpr.ac.in	11	16 to 17
U10	www.puchd.ac.in	8	13 to 14
U11*	www.bfuis.ac.in	14	19 to 20
U12	www.gadvasu.in	8	13 to 14
U13	www.pec.ac.in	11	16 to 17
U14	www.ctuniversity.in	8	13 to 14
U15*	www.gurukashiuniversity.in	2	07 to 08
U16	www.auts.ac.in	9	14 to 15
U17	www.gnauniversity.edu.in	10	15 to 16
U18	www.mrsphr.ac.in	10	15 to 16
U19	www.chitkara.edu.in	9	14 to 15
U20	www.rimt.ac.in	10	15 to 16
U21	www.rayatbahra.edu.in	9	14 to 15
U22	www.iimamritsar.ac.in	8	13 to 14
U23	www.adeshuniversity.ac.in	10	15 to 16
U24	www.web.gndu.ac.in	8	13 to 14

* means regional fonts are used in website

The Graphical representation of 24 websites of Universities in Punjab by using Flesch Kincaid Reading ease, Flesch

Kincaid Grade, Gunning Fog, SMOG, CL and ARI is shown in Figure 2.

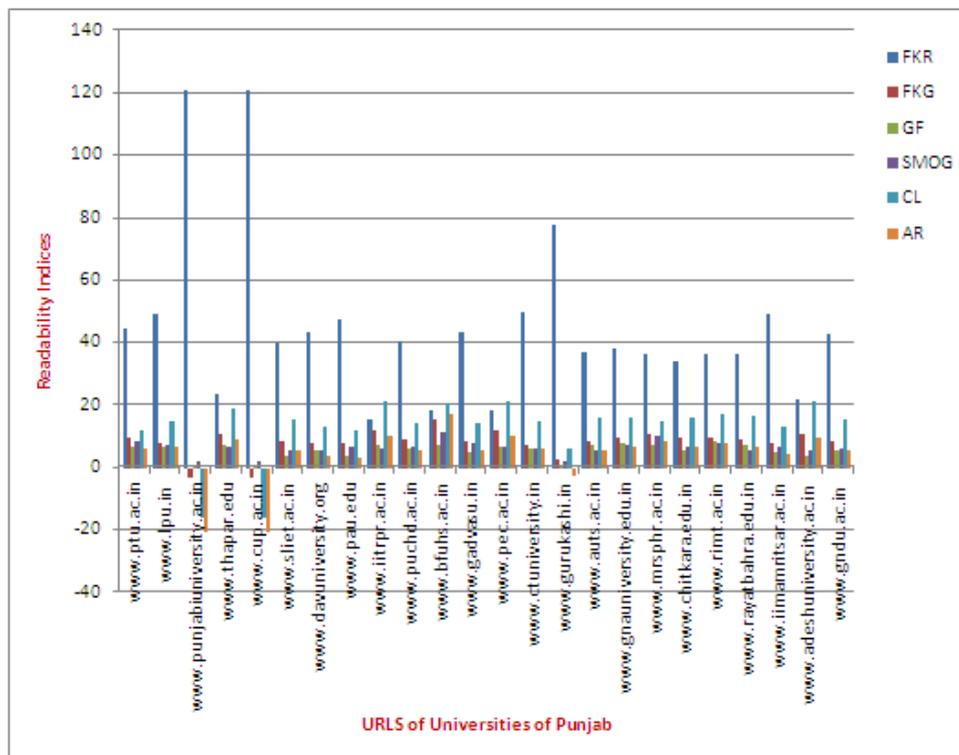


Figure 2: Representation of Readability indices of 24 University websites of Punjab

Interpretation: FKRE is high in U3 (121.2) i.e. Punjabi University, Patiala and U5 (121.2) i.e. Central University of Punjab, Bathinda but these websites are using regional fonts. As per US based grading system, Webpagefx tool is not considering regional fonts. So we have to skip the FKRE values of U3,U5, U11 and U15. Higher the value of FKRE indicates a text is easier to read and understand. From the results of Webpagefx tool, FKRE is high in U14 (www.ctuniversity.in), U2 (www.lpu.in) and U22

(www.iimamritsar.ac.in). FKG is high in U13(www.pec.ac.in), U9 (www.iitrpr.ac.in) and U1 (www.ptu.ac.in). For evaluating GF, ideal score is 7 or 8 and anything above is hard to read. The analysis was carried out from September to December, 2017 for measuring the readability indices of twenty-four websites of Universities in Punjab. Table 7 shows the analysis of website’s against their readability indices. For SMOG and ARI indices, the ideal score is 7.

Table 7: Analysis of Readability indices of websites carried out from September to December, 2017

Readability indices	Sept-Oct	Oct-Nov	Nov-Dec
FKRE	U14	U14,U2	U14,U2
FKG	U9, U13	U18	U18
GF	U16	U9	U16
SMOG	U13,U19,U22	U19,U22	U19,U22
CL	U2	U2	U2
ARI	U17	U17	U17

(U2:www.lpu.in, U9:www.iitrpr.ac.in, U13: www.pec.ac.in, U14: www.ctuniversity.in, U16: www.auts.ac.in, U17:www.gnauniversity.edu.in,U18: www.mrsphr.ac.in, U19: www.chitkara.edu.in, U22: www.iimamritsar.ac.in)

5. CONCLUSION AND FUTURE WORK

This paper has presented an analysis of twenty-four websites of Universities of Punjab based on six readability measurement techniques. The analysis was carried out with the help of readability tool (Webpagefx) [14]. The data collection was performed between September, 2017 to December 2017. As per the scores were based on US based grading system, there is a solid need to improve country based particular grading mechanism with respect to readability. If text is too complicated and hard to

understand, people will leave that webpage. On the other hand, if text scores a very low grade level, users will likely assume that content of webpage isn’t valuable. In order to maximize the readability, it’s important for the content of website to reflect the readability expectations of visitors. The average grade levels of these websites are represented in Figure 3. The Readability indices and Text statistics are measured with respect to different days to check whether it will affect University website grading or not. These measurements are shown in appendix Table A1, A2, A3, Table B1, B2 , B3 and Table C1, C2 and C3.

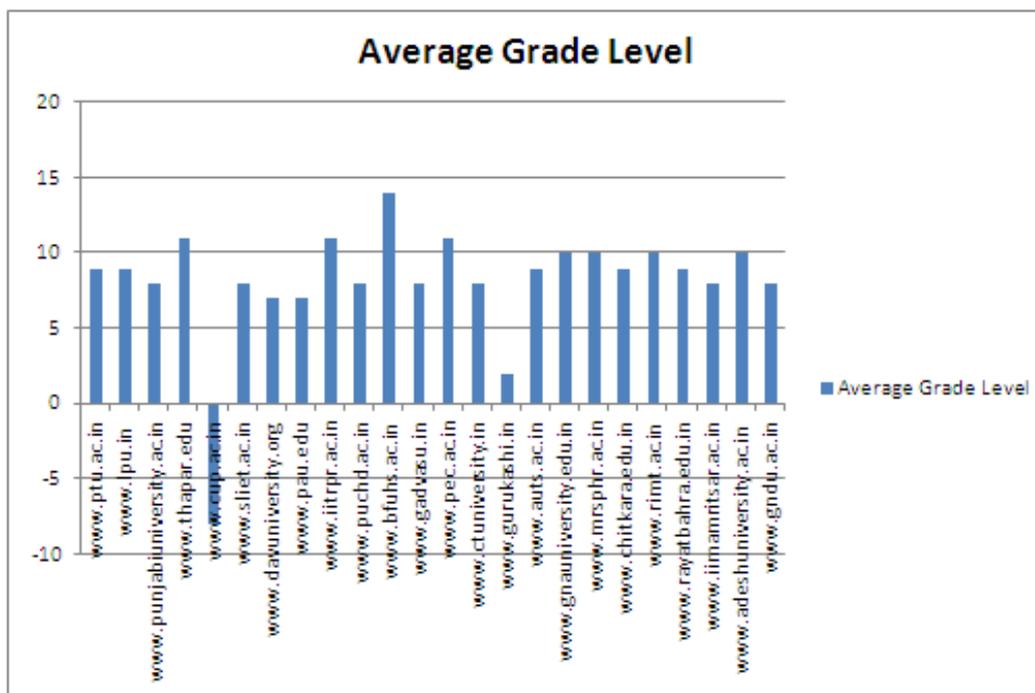


Figure 3: Average Grade Level

The complete readability score of these websites are not too good so there is a need for additional improvements. The main limitation of Webpagefx tool is that it does not recognize regional fonts of website, even though this tool works only on US based grading system. In order to appeal to target audience, text needs to meet their readability expectations. The main thing is to consider that whether the websites are for children or for adult readers? Understanding the readability expectations of target audience will help to keep people to remain websites for longer period of time, and increase engagement with website content.

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APPENDIX

Table A1: Readability Indices (30/9/2017)

S.No.	URLs	FKR	FKG	GF	SMOG	CL	AR
U1	www.ptu.ac.in	39.5	11	8.2	10.1	12.2	7.6
U2	www.lpu.in	50.4	7.9	6.8	7.1	14.9	6.5
U3*	www.punjabiversity.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U4	www.thapar.edu	24.3	10.9	7.4	6.9	19.2	8.7
U5*	www.cup.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U6	www.sliet.ac.in	37.6	8.8	4.3	5.8	16.3	5.9
U7	www.davuniversity.org	44	7.9	5.6	5.7	13.1	3.4
U8	www.pau.edu	45.9	8.3	3.8	6.9	12.3	3.9
U9	www.iitrpr.ac.in	15.6	12	6.9	6.6	21	9.8
U10	www.puchd.ac.in	40.8	8.9	5.9	6.9	14.3	5.3
U11*	www.bfuhs.ac.in	18.4	15.4	7.6	11.6	20.5	17.1
U12	www.gadvasu.in	42	9	5.3	7.9	14.3	5.9
U13	www.pec.ac.in	15.6	12.2	6.4	7.2	21.6	10.8
U14	www.ctuniversity.in	50.4	7.5	6.2	6.4	15	5.8
U15*	www.gurukashiuniversity.in	77.9	2.9	0.8	1.8	6.1	-2.8
U16	www.auts.ac.in	41.9	8.1	6.9	5.4	15.4	5
U17	www.gnauniversity.edu.in	38.3	9.4	7.7	7.4	15.8	6.9
U18	www.mrsphr.ac.in	33.4	12.3	8.4	11.5	14.8	10.5
U19	www.chitkara.edu.in	34.2	9.7	5.7	7	16.2	6.6
U20	www.rimt.ac.in	35.7	9.9	8.4	7.8	17.2	8.3
U21	www.rayatbakra.edu.in	36.5	9.1	7.6	5.9	16.9	6.6
U22	www.iimamritsar.ac.in	49.2	7.8	5.1	7	13.3	4.6
U23	www.adeshuniversity.ac.in	22.2	10.8	3.8	5.5	21.1	9.5
U24	www.web.gndu.ac.in	41.8	8.6	5.9	6.3	15.5	6

* means regional fonts are used in website

Table A2:Text Statistics(30/09/2017)

S.No.	URLs	No. of sentences	No. of words	No. of complex words	% of complex words	Average words/sentences	Average syllables/words
U1	www.ptu.ac.in	92	949	200	21.07	13.17	1.79
U2	www.lpu.in	538	2974	568	19.10	6.80	1.74
U3 ^x	www.punjabiversity.ac.in	1	1	0	0	1	1
U4	www.thapar.edu	193	683	166	24.30	4.28	1.96
U5 ^x	www.cup.ac.in	1	1	0	0	1	1
U6	www.sliet.ac.in	161	451	114	25.28	3.17	1.90
U7	www.davuniversity.org	324	1056	278	26.3	3.31	1.88
U8	www.pau.edu	189	981	220	22.43	5.69	1.80
U9	www.iitrpr.ac.in	105	359	124	34.54	3.49	2.22
U10	www.puchd.ac.in	100	522	129	24.71	5.40	1.89
U11 ^x	www.bfuhs.ac.in	1	19	4	21.05	19	2
U12	www.gadvasu.in	381	2156	529	24.54	6.36	1.81
U13	www.pec.ac.in	148	602	190	31.56	4.47	2.17
U14	www.ctuniversity.in	135	700	154	22	5.19	1.79
U15 ^x	www.gurukashiuniversity.in	2	4	0	0	2.0	1.50
U16	www.auts.ac.in	453	1043	226	21.67	2.80	1.84
U17	www.gnauniversity.edu.in	335	1721	432	25.10	6.00	1.91
U18	www.mrsphr.ac.in	206	2976	789	26.51	14.92	1.87
U19	www.chitkara.edu.in	627	2381	561	23.56	4.83	1.89
U20	www.rimt.ac.in	192	1220	326	26.72	6.49	1.94
U21	www.rayatbahra.edu.in	269	991	257	25.93	3.68	1.97
U22	www.iimamritsar.ac.in	60	331	85	25.68	5.52	1.80
U23	www.adeshuniversity.ac.in	53	113	31	27.43	2.54	2.13
U24	www.web.gndu.ac.in	324	1487	364	24.48	4.61	1.89

^x means regional fonts are used in website**Table A3: Average Grade Level Test Results (30/09/2017)**

S.No.	URLs	Average Grade Level	No. of Years old to easily understand
U1	www.ptu.ac.in	10	15 to 16
U2	www.lpu.in	9	14 to 15
U3 [*]	www.punjabiversity.ac.in	-8	-3 to -2
U4	www.thapar.edu	11	16 to 17
U5 [*]	www.cup.ac.in	-8	-3 to -2
U6	www.sliet.ac.in	8	13 to 14
U7	www.davuniversity.org	7	12 to 13
U8	www.pau.edu	7	12 to 13
U9	www.iitrpr.ac.in	11	16 to 17
U10	www.puchd.ac.in	8	13 to 14
U11 [*]	www.bfuhs.ac.in	14	19 to 20
U12	www.gadvasu.in	8	13 to 14
U13	www.pec.ac.in	12	16 to 17
U14	www.ctuniversity.in	8	13 to 14
U15 [*]	www.gurukashiuniversity.in	2	07 to 08
U16	www.auts.ac.in	8	13 to 14
U17	www.gnauniversity.edu.in	9	14 to 15
U18	www.mrsphr.ac.in	12	17 to 18
U19	www.chitkara.edu.in	9	14 to 15
U20	www.rimt.ac.in	10	15 to 16
U21	www.rayatbahra.edu.in	9	14 to 15
U22	www.iimamritsar.ac.in	8	13 to 14
U23	www.adeshuniversity.ac.in	10	15 to 16
U24	www.web.gndu.ac.in	8	13 to 14

^x means regional fonts are used in website

Table B1:Readability Indices(30/10/2017)

S.No.	URLs	FKR	FKG	GF	SMOG	CL	AR
U1	www.ptu.ac.in	39.3	11	8.2	10.1	12.2	7.5
U2	www.lpu.in	50.4	7.9	6.8	7.1	14.9	6.5
U3*	www.punjabiversity.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U4	www.thapar.edu	25.5	10.8	7.3	6.9	18.9	8.5
U5*	www.cup.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U6	www.sliet.ac.in	37.6	8.8	4.3	5.8	16.3	5.9
U7	www.davuniversity.org	44	7.9	5.6	5.7	13.1	3.4
U8	www.pau.edu	46.4	8.1	3.7	6.8	12.2	3.8
U9	www.iitrpr.ac.in	15.6	12	6.9	6.6	21	9.8
U10	www.puchd.ac.in	40.3	9	6	6.9	14.4	5.5
U11*	www.bfuhs.ac.in	18.4	15.4	7.6	11.6	20.5	17.1
U12	www.gadvasu.in	43.7	8.7	5.3	7.8	13.9	5.5
U13	www.pec.ac.in	15.9	12.2	6.3	7.3	21.5	10.7
U14	www.ctuniversity.in	50.4	7.5	6.2	6.4	15	5.8
U15*	www.gurukashiuniversity.in	77.9	2.9	0.8	1.8	6.1	-2.8
U16	www.auts.ac.in	41.9	8.1	6.9	5.4	15.4	5
U17	www.gnauniversity.edu.in	40.2	9.1	7.7	7.3	15.6	6.7
U18	www.mrsphr.ac.in	33.1	12.4	8.5	11.6	14.9	10.7
U19	www.chitkara.edu.in	34.5	9.7	5.8	7	16.1	6.6
U20	www.rimt.ac.in	35.7	9.9	8.4	7.8	17.2	8.3
U21	www.rayatbahra.edu.in	37.2	9	7.4	5.8	16.6	6.3
U22	www.iimamritsar.ac.in	49.2	7.8	5.1	7	13.3	4.6
U23	www.adeshuniversity.ac.in	22.2	10.8	3.8	5.5	21.1	9.5
U24	www.web.gndu.ac.in	42.1	8.6	6.1	6.5	15.4	6

* means regional fonts are used in website

Table B2:Text Statistics(30/10/2017)

S.No.	URLs	No. of sentences	No. of words	No. of complex words	% of complex words	Average words/sentences	Average syllables/w words
U1	www.ptu.ac.in	92	940	198	21.06	13.04	1.79
U2	www.lpu.in	538	2974	568	19.10	6.80	1.74
U3 ^x	www.punjabiversity.ac.in	1	1	0	0	1	1
U4	www.thapar.edu	196	692	165	23.84	4.27	1.94
U5 ^x	www.cup.ac.in	1	1	0	0	1	1
U6	www.sliet.ac.in	161	451	114	25.28	3.17	1.90
U7	www.davuniversity.org	324	1056	278	26.3	3.31	1.88
U8	www.pau.edu	189	945	214	22.65	5.48	1.80
U9	www.iitrpr.ac.in	105	359	124	34.54	3.49	2.22
U10	www.puchd.ac.in	101	522	129	24.71	5.40	1.89
U11 ^x	www.bfuhs.ac.in	1	19	4	21.05	19	2
U12	www.gadvasu.in	381	2156	529	24.54	6.36	1.81
U13	www.pec.ac.in	148	602	190	31.56	4.47	2.17
U14	www.ctuniversity.in	135	700	154	22	5.19	1.79
U15 ^x	www.gurukashiuniversity.in	2	4	0	0	2.0	1.50
U16	www.auts.ac.in	453	1043	226	21.67	2.80	1.84
U17	www.gnauniversity.edu.in	335	1721	419	24.35	6.00	1.89
U18	www.mrsphr.ac.in	206	3029	800	26.41	15.19	1.87
U19	www.chitkara.edu.in	632	2405	566	23.53	4.84	1.89
U20	www.rimt.ac.in	192	1220	326	26.72	6.49	1.94
U21	www.rayatbahra.edu.in	278	998	257	25.75	3.59	1.96
U22	www.iimamritsar.ac.in	60	331	85	25.68	5.52	1.80
U23	www.adeshuniversity.ac.in	53	113	31	27.43	2.54	2.13
U24	www.web.gndu.ac.in	331	1596	391	24.5	4.84	1.89

^x means regional fonts are used in website

Table B3: Average Grade Level Test Results (30/10/2017)

S.No.	URLs	Average Grade Level	No. of Years old to easily understand
U1	www.ptu.ac.in	10	15 to 16
U2	www.lpu.in	9	14 to 15
U3*	www.punjabiversity.ac.in	-8	-3 to -2
U4	www.thapar.edu	10	15 to 16
U5*	www.cup.ac.in	-8	-3 to -2
U6	www.sliet.ac.in	8	13 to 14
U7	www.davuniversity.org	7	12 to 13
U8	www.pau.edu	7	12 to 13
U9	www.iitrpr.ac.in	11	16 to 17
U10	www.puchd.ac.in	8	13 to 14
U11*	www.bfuhs.ac.in	14	19 to 20
U12	www.gadvasu.in	8	13 to 14
U13	www.pec.ac.in	12	16 to 17
U14	www.ctuniversity.in	8	13 to 14
U15*	www.gurukashiuniversity.in	2	07 to 08
U16	www.auts.ac.in	8	13 to 14
U17	www.gnauniversity.edu.in	9	14 to 15
U18	www.mrspshr.ac.in	12	17 to 18
U19	www.chitkara.edu.in	9	14 to 15
U20	www.rimt.ac.in	10	15 to 16
U21	www.rayatbahra.edu.in	9	14 to 15
U22	www.iimamritsar.ac.in	8	13 to 14
U23	www.adeshuniversity.ac.in	10	15 to 16
U24	www.web.gndu.ac.in	8	13 to 14

* means regional fonts are used in website

Table C1: Readability Indices(30/11/17)

S.No.	URLs	FKR	FKG	GF	SMOG	CL	AR
U1	www.ptu.ac.in	39.3	11	8.2	10.1	12.2	7.5
U2	www.lpu.in	50.4	7.9	6.8	7.1	14.9	6.5
U3*	www.punjabiversity.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U4	www.thapar.edu	25.5	10.8	7.3	6.9	18.9	8.5
U5*	www.cup.ac.in	121.2	-3.4	0.4	1.8	-16.1	-20.9
U6	www.sliet.ac.in	37.6	8.8	4.3	5.8	16.3	5.9
U7	www.davuniversity.org	44.9	7.8	5.6	5.6	12.9	3.2
U8	www.pau.edu	48	7.9	3.6	6.7	11.4	3.1
U9	www.iitrpr.ac.in	16.6	11.9	8	6.9	20.6	9.7
U10	www.puchd.ac.in	40.3	9	6	6.9	14.4	5.5
U11*	www.bfuhs.ac.in	18.4	15.4	7.6	11.6	20.5	17.1
U12	www.gadvasu.in	43.6	8.7	5.4	7.8	14.1	5.6
U13	www.pec.ac.in	15.9	12.2	6.3	7.3	21.5	10.7
U14	www.ctuniversity.in	50.4	7.5	6.2	6.4	15	5.8
U15*	www.gurukashiuniversity.in	77.9	2.9	0.8	1.8	6.1	-2.8
U16	www.auts.ac.in	41.9	8.1	6.9	5.4	15.4	5
U17	www.gnauniversity.edu.in	38.5	9.3	7.6	7.3	15.8	6.8
U18	www.mrspshr.ac.in	32.6	12.5	8.5	11.7	14.9	10.8
U19	www.chitkara.edu.in	34.5	9.7	5.8	7	16.1	6.6
U20	www.rimt.ac.in	35.7	9.9	8.4	7.8	17.2	8.3
U21	www.rayatbahra.edu.in	37	9	7.4	5.8	16.6	6.4
U22	www.iimamritsar.ac.in	49.2	7.8	5.1	7	13.3	4.6
U23	www.adeshuniversity.ac.in	22.2	10.8	3.8	5.5	21.1	9.5
U24	www.web.gndu.ac.in	41	8.78	6.2	6.5	15.7	6.2

* means regional fonts are used in website

Table C2: Text Statistics(30/11/17)

S.No.	URLs	No. of sentences	No. of words	No. of complex words	% of complex words	Average words/sentences	Average syllables/w ords
U1	www.ptu.ac.in	92	940	198	21.06	13.04	1.79
U2	www.lpu.in	538	2974	568	19.10	6.80	1.74
U3 ^x	www.punjabiversity.ac.in	1	1	0	0	1	1
U4	www.thapar.edu	196	689	165	23.95	4.24	1.94
U5 ^x	www.cup.ac.in	1	1	0	0	1	1
U6	www.sliet.ac.in	161	451	114	25.28	3.17	1.90
U7	www.davuniversity.org	320	1038	272	26.20	3.29	1.87
U8	www.pau.edu	194	970	214	22.06	5.46	1.78
U9	www.iitrpr.ac.in	108	414	141	34.06	3.91	2.20
U10	www.puchd.ac.in	101	527	131	24.86	5.39	1.89
U11 ^x	www.bfuhs.ac.in	1	19	4	21.05	19	2
U12	www.gadvasu.in	390	2176	538	24.72	6.27	1.79
U13	www.pec.ac.in	148	602	190	31.56	4.47	2.17
U14	www.ctuniversity.in	135	700	154	22	5.19	1.79
U15 ^x	www.gurukashiuniversity.in	2	4	0	0	2.0	1.50
U16	www.auts.ac.in	453	1043	226	21.67	2.80	1.84
U17	www.gnauniversity.edu.in	339	1714	428	24.97	5.89	1.91
U18	www.mrsphr.ac.in	202	3003	795	26.47	15.36	1.87
U19	www.chitkara.edu.in	632	2405	566	23.53	4.84	1.89
U20	www.rimt.ac.in	192	1220	326	26.72	6.49	1.94
U21	www.rayatbahra.edu.in	278	998	258	25.85	3.59	1.96
U22	www.iimamritsar.ac.in	60	331	85	25.68	5.52	1.80
U23	www.adeshuniversity.ac.in	53	113	31	27.43	2.54	2.13
U24	www.web.gndu.ac.in	314	1473	374	25.39	4.71	1.90

^x means regional fonts are used in website**Table C3: Average Grade(30/11/17)**

S.No.	URLs	Average Grade Level	No. of Years old to easily understand
U1	www.ptu.ac.in	10	15 to 16
U2	www.lpu.in	9	14 to 15
U3 ^x	www.punjabiversity.ac.in	-8	-3 to -2
U4	www.thapar.edu	10	15 to 16
U5 ^x	www.cup.ac.in	-8	-3 to -2
U6	www.sliet.ac.in	8	13 to 14
U7	www.davuniversity.org	7	12 to 13
U8	www.pau.edu	7	12 to 13
U9	www.iitrpr.ac.in	11	16 to 17
U10	www.puchd.ac.in	8	13 to 14
U11 ^x	www.bfuhs.ac.in	14	19 to 20
U12	www.gadvasu.in	8	13 to 14
U13	www.pec.ac.in	12	16 to 17
U14	www.ctuniversity.in	8	13 to 14
U15 ^x	www.gurukashiuniversity.in	2	07 to 08
U16	www.auts.ac.in	8	13 to 14
U17	www.gnauniversity.edu.in	9	14 to 15
U18	www.mrsphr.ac.in	12	17 to 18
U19	www.chitkara.edu.in	9	14 to 15
U20	www.rimt.ac.in	10	15 to 16
U21	www.rayatbahra.edu.in	9	14 to 15
U22	www.iimamritsar.ac.in	8	13 to 14
U23	www.adeshuniversity.ac.in	10	15 to 16
U24	www.web.gndu.ac.in	9	14 to 15

^xmeans regional fonts are used in website