Web Accessibility Analysis of Indonesia Inclusive Vocational High Schools

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Abstract. Students with disabilities have the same rights as normal students in accessing the inclusive vocational high school webs. This study aims to analyze the web accessibility of inclusive vocational high schools for students with disabilities. This research is a qualitative descriptive research. Website accessibility was analyzed using Taw, Wave, and Achecker. There are 42 inclusive vocational high school websites that will be the source of data. The results of the analysis of the 3 tools were then compared and described. Web accessibility of Indonesia inclusive vocational high schools using TAW, the most problems that arise are operable aspects, when using ACheker the most problems that arise are non-text content, and when using wave the most common problem is error contrast.

Keywords: Accessibility · Inclusive vocational high school · Students with disability · Webs

1 Introduction

Everyone has the right to a proper education, including persons with disabilities [1, 2]. In Indonesia, the government has an obligation to carry out this which is stated in Law no. 20 of 2003 concerning the National Education System, Article 5 Paragraph (1) which states, "Every citizen has the same right to obtain quality education". However, only 13.4% of persons with disabilities have completed 12 years of normal education and higher education [3].

Inclusive education is an education system that provides opportunities for all students who have disabilities and have the potential for intelligence and/or special talents to participate in education or learning together with normal students in classes. One of them is a inclusive vocational high school that organizes inclusive education [4].

Like other formal education, inclusive vocational high schools use websites as a medium of information to the public, including students with disabilities. Students with disabilities have the same rights even though they have different limitations from normal students. Therefore, in order for the website to have high accessibility, it is necessary to use the WCAG 2 guidelines. This guide aims to provide guidance to website designers so that the website developed can be seen, understood, and used by all users. There are four

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main principles of WCAG including: perceivable, operable, understandable, and robust, while the success criteria for measuring the level of compliance of a website consist of three levels, namely level A (minimum level of accessibility), level AA (intermediate level of accessibility), and level AAA (maximum level of accessibility) [5].

The easiest and fastest research on website accessibility analysis is to use an online checking tool in the form of an application [6]. There are 3 applications that can be used, namely TAW, Wave, and Sortsite which are accessed online [7, 8].

Several studies on website accessibility using automated evaluation tools have been conducted on websites of private institutions [9, 10], higher educations [11, 12], and governments [13–15]. However, no one has investigated the evaluation of inclusive vocational high schools.

The hope from this research will be to find out how much web accessibility the Indonesia inclusive vocational high schools is, find out the problems that reduce accessibility so that later it can be a recommendation for developers to be able to develop websites that are easily accessible for people with disabilities.

2 Method

This research is a descriptive research. Website accessibility was analyzed using TAW, AChecker, and Wave tools. There are 42 websites of vocational high schools that provide inclusive education that gotten from http://takola.pklk.kemdikbud.go.id/abi. Normality test using kolmogorov smirnov with Minitab. The results of the analysis of the 3 tools were then compared and described.

3 Result and Discussion

3.1 Vocational High Schools that Proclaimed Inclusive Education

The website http://takola.pklk.kemdikbud.go.id/abi is a website for the Indonesian ministry of education and culture that displays formal school levels that accept students with disabilities in Indonesia, starting from elementary, middle, and high schools, and vocational schools. The Table 1 and Fig. 1 show a search results for inclusive vocational schools.

3.2 Problems of Inclusive Vocational School Webs Using Taw

Web accessibility analysis results are divided into four aspects, namely perceivable operable, understable, and robust aspects like Fig. 2.

3.3 Problems of Inclusive Vocational School Webs Using AChecker

Web accessibility analysis results are divided into 2 problems, namely known problems and likely problems like Fig. 3.

Table 1. Vocational High Schools that proclaimed inclusive education

No	School Codes	School names	Disability Types	URL
1	S2ML	SMKN 2 Malang	Mild mental retardation, Moderate mental retardation, autism	https://www.smkn2malang.sch.id/
2	S6YO	SMKN 6 Yogyakarta	Deaf	https://smkn6jogja.sch.id/
3	S4PD	SMKN 4 Padang	Learning disability	https://smk4-padang.sch.id/
4	S3JO	SMKN 3 Jombang	Gifted	https://smkn3-jbg.sch.id/Home/
5	S9SR	SMKN 9 Surakarta	Deaf, Quadriplegia, Learning disability	https://www.smkn9-solo.sch.id/
6	S2BY	SMK BOPKRI 2 Yogyakarta	Deaf, Quadriplegia, Learning disability	https://smkbopkri2yogya.sch.id/
7	S6MY	SMK Muhammadiyah 4 Yogyakarta	Learning disability	https://smkmuh4-yog.sch.id/
8	SMTI	SMKN Tehnologi Industri	Gifted	https://www.smtijogja.sch.id/
9	S3YO	SMKN 3 Yogyakarta	Blind, gifted	https://smkn3jogja.sch.id/
10	S2YO	SMKN 2 Yogyakarta	Gifted, Learning disability, indigo	http://www.smk2-yk.sch.id/
11	S2MY	SMK Muhammadiyah 2 Yogyakarta	Blind, Moderate mental retardation, emotionally handicapped, gifted	https://www.smkmuh2-yogya.sch.id/
12	S3MP	SMK Muhammadiyah 3 Purwokerto	Autism	http://smkmuh3pwt.sch.id/
13	STIP	SMKS TI Bina Citra Informatika Purwokerto	Quadriplegia	https://smktibintrapwt.sch.id/
14	SYFF	SMK Yapis Fak Fak	Quadriplegia, learning disability	https://smkyapisfakfak.sch.id/
15	S6MW	SMKN 6 Masni Wanokwari	Deaf	http://smkn6masnimanokwari.mysch.id/

(*continued*)

Table 1. (*continued*)

No	School Codes	School names	Disability Types	URL
16	SPME	SMK Proklamasi Muaraenim	Blind, mild mental retardation, Hyperactive, Quadriplegia	https://www.smkproklamasimuaraenim.sch.id/
17	S11S	SMKN 11 Semarang	Moderate mental retardation	https://smkn11smg.sch.id/
18	S3KA	SMKN 3 Kaur	Gifted	https://smkn-3-kaur.business.site/
19	S1KB	SMKN 1 Kota Bengkulu	Blind	https://smkn1bengkulu.sch.id/laman/
20	S5SD	SMK Negeri 5 Samarinda	Hyperactive, autism	https://smkn5smd.sch.id/
21	S1SD	SMK Negeri 1 Samarinda	Autism	http://smkn1samarinda.sch.id/
22	S1JA	SMK N 1 Jarai	Moderate mental retardation	https://www.smkn1jarai.sch.id/
23	S3SB	SMKN 3 Surabaya	Blind, moderate mental retardation, emotionally handicapped	https://smkn3-sby.sch.id/
24	S4SB	SMKN 4 Surabaya	Hyperactive, learning disability	http://www.smkn4sby.sch.id/
25	S1BJ	SMK Negeri 1 Banjarmasin	learning disability	https://smkn1bjm.sch.id/
26	S5BJ	SMKN 5 Banjarmasin	Blind	https://smkn5bjm.sch.id/
27	S2PT	SMKN 2 Praya Tengah	Deaf, mild mental retardation, moderate mental retardation, speech impaired, learning disability	https://smkn2-prayatengah.sch.id/
28	S1JN	SMK N 1 Janapria	learning disability	https://smkn1janapria.sch.id/
29	SPWM	SMK Pratama Widya Mandala Badung	Gifted	http://www.smkprawima.sch.id/
30	S7HB	SMK Negeri 7 Halmahera Barat	mild mental retardation	http://smknegeri7halmaherabarat.mysch.id/
31	SMAL	SMK Misbahul Aulad Labuha	Gifted, learning disability	https://smkmisbah.sch.id/

(*continued*)

Table 1. (*continued*)

No	School Codes	School names	Disability Types	URL
32	S1KO	SMKN 1 Kolaka	mild mental retardation	https://smkn01kolaka.sch.id/
33	S2KR	SMKN 2 Kendari	learning disability	http://smk2kdi.mysch.id/
34	S3TR	SMKN 3 Tangerang	Gifted	https://smkn3-tng.sch.id/
35	S2TR	SMKN 2 Kota Serang	Gifted	https://www.smkn2serang.sch.id/
36	STSP	SMK Telkom Sandhy Putra Medan	Gifted	http://web.smktelkommedan.sch.id/
37	S1BO	SMKN 1 Sibolga	blind	https://smkn1sibolga.sch.id/
38	S9BG	SMKN 9 Bandung	Deaf, Quadriplegia, gifted	http://smkn9bandung.sch.id/
39	S2BG	SMK Negeri 2 Bandung	blind	http://smkn2bandung.sch.id/
40	SATG	SMK Almamater Telaga	autism	http://smkalmamater.mysch.id/
41	S2GU	SMKN 2 Gorontalo Utara	gifted	http://smkn2gorontalouutara.sch.id/
42	STMS	SMK Telkom Makassar	Quadriplegia	https://smktelkom-mks.sch.id/

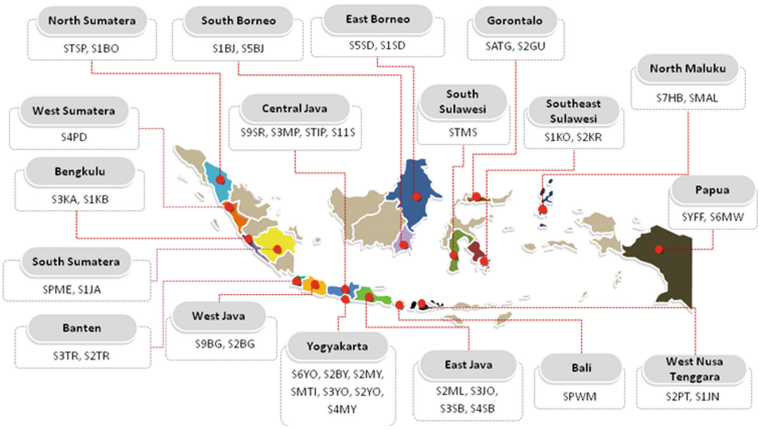

Fig. 1. A map of the distribution of school webs as the sample for analysis

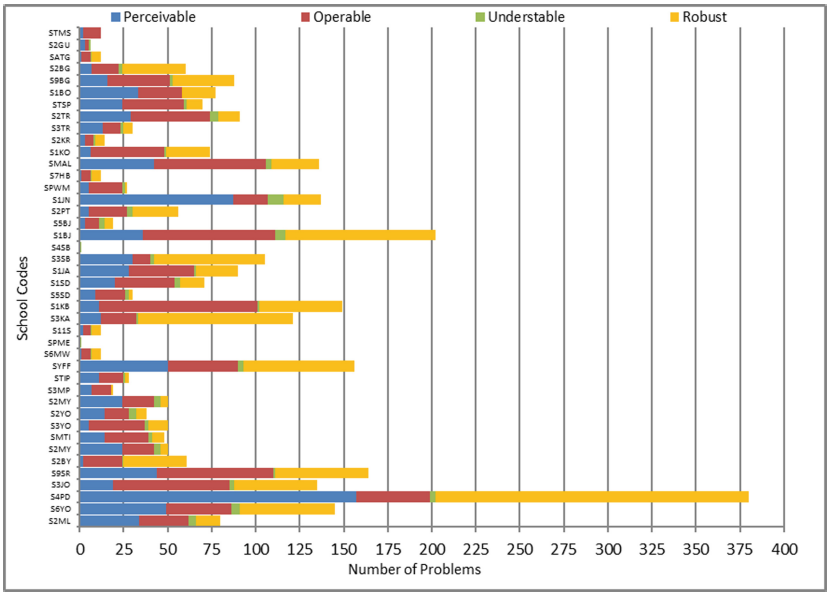

Fig. 2. Map of the distribution of school webs as the sample

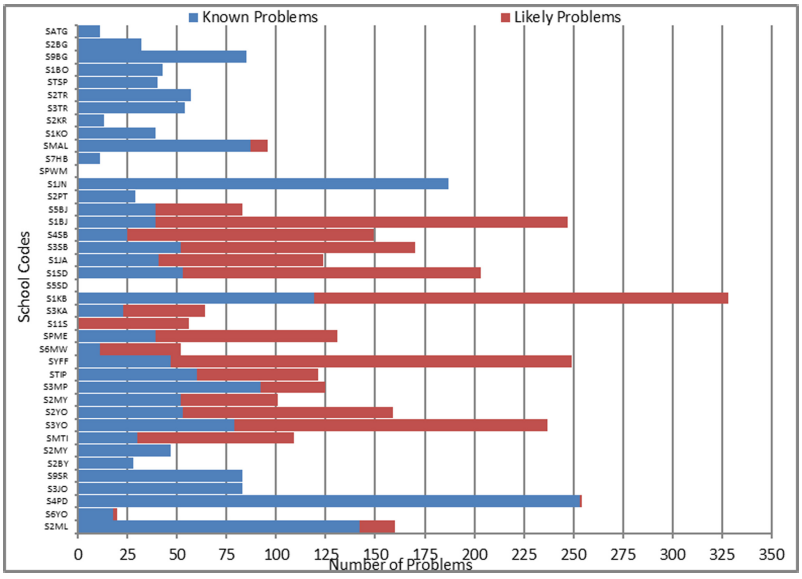

Fig. 3. Number problems of inclusive vocational school webs accessibility using Achecker

3.4 Problems of Inclusive Vocational School Webs Using WAVE

Web accessibility analysis results are divided into 2 problems, namely errors and contrast errors like Fig. 4.

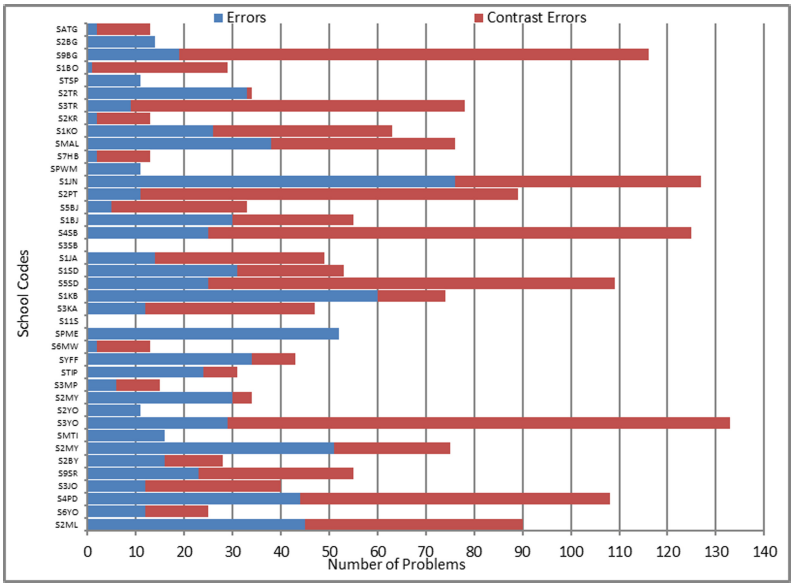

Fig. 4. Number problems of inclusive vocational school webs accessibility using WAVE

Table 2. Normality Test.

	Kolmogorov-Smirnov				
	KS_Result	KS_Table	N	P-Value	α
TAW	0.158	0.179	42	< 0.010	0.05
WAVE	0.125	0.179	42	0.096	0.05
AChecker	0.311	0.179	42	< 0.010	0.05

3.5 Data Analysis

Statistical analysis in this study was conducted to interpret the results of checking using 3 tools. The results were first sought to find out the normality of the data as in Table 2. After that, the results were analyzed descriptively. The descriptive statistics of TAW, WAVE, and AChecker can be seen in Table 3.

Based on the normality test, the web checking using TAW and AChecker is not normal, but the web checking using WAVE is normally distributed because KS result 0.15 < KS table 0.79 and 0.05 < 0.96.

Table 3. Descriptive Analysis Result

		TAW	WAVE	ACHECKER
N	Valid	42	42	42
	Missing	0	0	0
Mean		68.83	48.57	64.70
SE Mean		9.93	5.88	17.80
Std Deviation		64.37	38.14	115.4
Skewness		2.12	0.77	5.44
Kurtois		6.80	0.43	32.55
Mode		5	4	4
Minium		1	0	0
Maximum		341	133	753
Sum		2891	2040	2717

3.6 Discussion

Based on Fig. 2, the biggest problem is operable aspect, followed by robust, perceivable, and understable aspects. The operable aspect that often arises is the navigable criteria. The navigable criteria are link purpose and section headings, while the main warnings are on bypass blocks, page titled, focus order, headings and labels, focus visible, and the keyboard (no exception). To see which parts are problematic, you can use the Wave tool. The following is an example of a problem with an operable aspect, namely empty link.

Empty link make matter because if a link contains no text, the function or purpose of the link will not be presented to the user. This can introduce confusion for keyboard and screen reader users. To resolve it, The website desginer must to Remove the empty link or provide text within the link that describes the functionality and/or target of that link [16].

The main problems of robust aspect is parsing criteria. Parsing criteria are In content implemented using markup languages, elements have complete start and end tags, elements are nested according to their specifications, elements do not contain duplicate attributes, and any IDs are unique, except where the specifications allow these features [17]. Commonly start and end tags that are missing a critical character in their formation, such as a closing angle bracket or a mismatched attribute value quotation mark are not complete.

The common problem of perceivable aspects is in Non-Text Content (Level A). Non-Text Content that is presented to the user has a text alternative that serves the equivalent purpose. To know which parts are problematic, you can use the Wave tool. The following is an example of a perceivable aspect problem, namely: missing alternative text.

To resolve it, web designer must to Add an alt attribute to the image. The attribute value should accurately and succinctly present the content and function of the image.

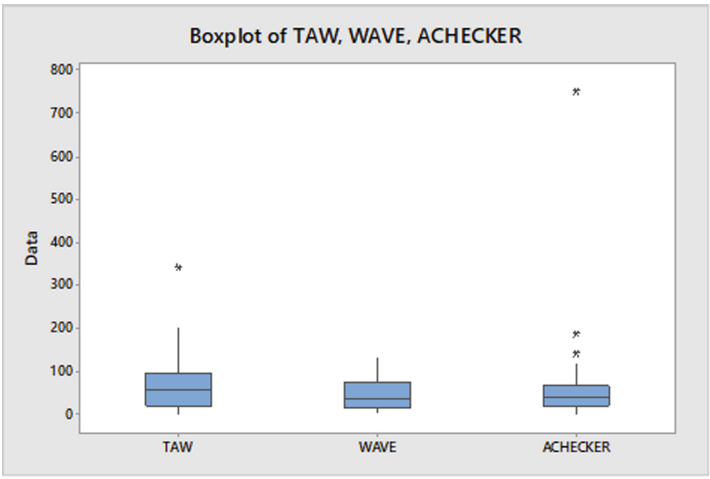

Fig. 5. Bloxplot of TAW, Wave, and Achecker

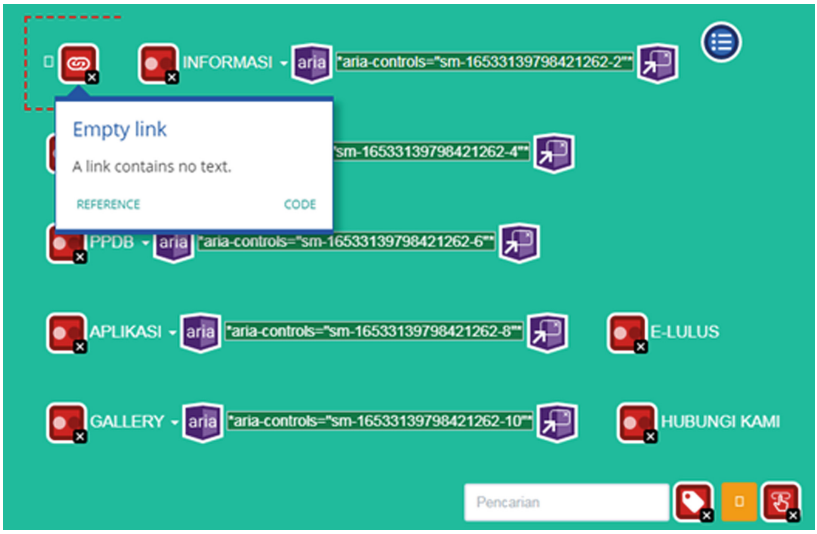

Fig. 6. Icon of empty link using Wave

If the content of the image is conveyed in the context or surroundings of the image, or if the image does not convey content or have a function, it should be given empty/null alternative text (alt = “”) [16] (Figs. 5, 6, 7, 8 and 9).

Based on Fig. 4, the contrast errors are greater than the errors. Contrast errors occur because the color contrast between the image and the background is very low. To see which parts are problematic, you can use the Wave tool. To resolve this, web designer must to increase the contrast between the foreground (text) color and the background

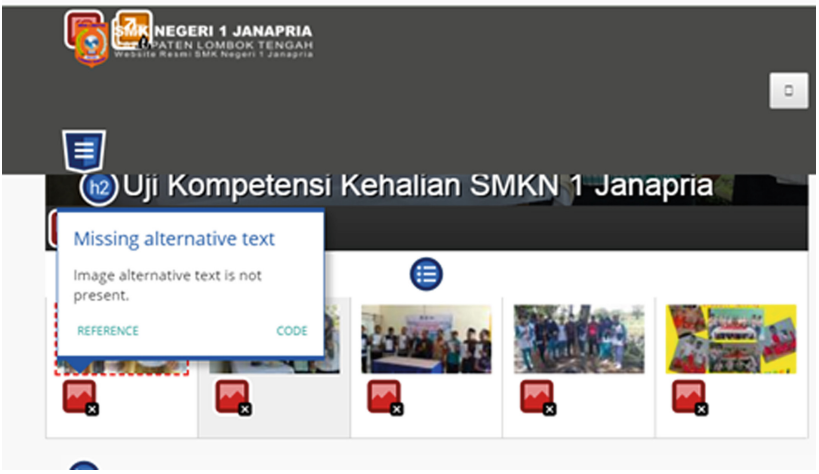

Fig. 7. Icon of missing alternative text using Wave

Fig. 8. Icon of contrast errors using Wave

color. Large text (larger than 18 point or 14 point bold) does not require as much contrast as smaller text [16].

Based on Fig. 3 known problems are bigger than likely problems. The main problems is Non-text Content wherein image used as anchor is missing valid Alt text. To resolve it designer must to add Alt text that identifies the purpose or function of the image. When you use Achecker there will be problems, how to check, and where the problem lies.

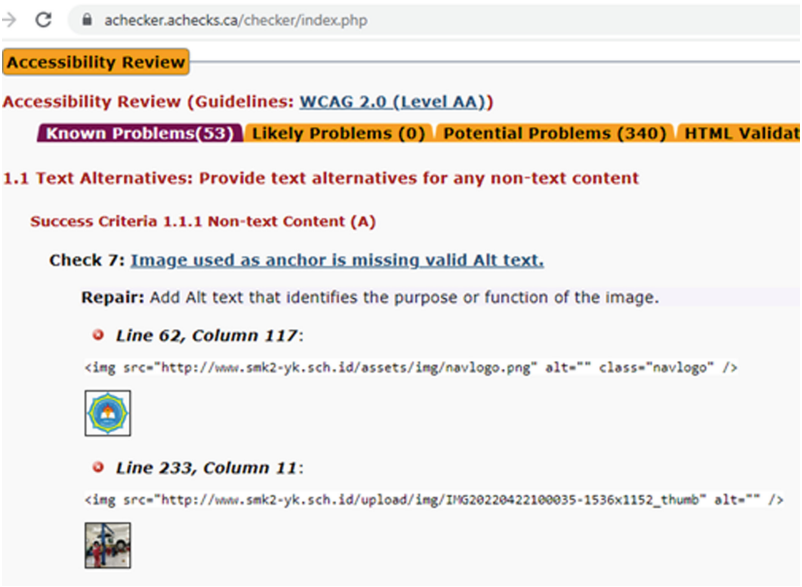

Fig. 9. web display of checking results using achecker

4 Conclusions

The results of checking using 3 tools show that the main problem of each tool is different. When checking the accessibility of webs of inclusive vocational high schools using TAW, the most problems that arise are operable aspects, when using ACheker the most problems that arise are non-text content, and when using Wave the most common problem is Error Contrast.

Further research is needed in order to find out more in-depth problems that affect the level of accessibility of inclusive vocational high schools in Indonesia. Due to time constraints, the evaluation in this study was only carried out using 3 checking tools. Further analysis is needed to be able to analyze the problems in more detail that affect the level of accessibility of the webs of vocational high schools.

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