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Assessing the Usability of Popular English Language Learning (ELL) Websites: An Automated Evaluation Approach

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ABSTRACT
Technical quality is a fundamental component of website quality. Inefficiently designed websites can cause dissatisfaction among users, resulting in a high bounce rate where they just view the main page without exploring other pages. Thus, this study attempts to evaluate the technical quality of popular English Language Learning (ELL) websites in relation to 'Site Performance', 'Mobile Friendliness', 'SEO', and 'Security' aspects. The PageRank (PR) tool was utilised to choose the sample according to their popularity and significance. Only 24 ELL websites with high importance rankings (PR5-PR9) were selected as the sample for the study. An automated website evaluation tool called Website Grader was used to evaluate the technical quality of these websites. 71% of the examined ELL websites are rated as having average technical quality. 17% of websites are considered to have good technical quality. The abundance of average-to-good quality ELL websites highlights the significant potential of these valuable resources for use within the teaching and learning context. The findings offer website hosts valuable insights into the deficiencies and urgent need to improve the quality of their websites. Furthermore, this assessment offers insight into the effectiveness of automated evaluation techniques in evaluating language learning websites. Comparative studies may be carried out to determine the technical quality based on the various tools used.

Keywords: Automated tool, Computer-Assisted Language Learning, English Language Learning websites, website evaluation, usability.

INTRODUCTION

The ever-growing number of websites dedicated to language learning and teaching has emerged as a prominent phenomenon in the field of language education in recent years [1]. English Language Learning (ELL) websites offer amazing possibilities for language acquisition due to their high level of accessibility, allowing learners to engage with the resources regardless of time [2].

These websites also promote interactivity, which aids in the retention of information [3]. Moreover, the variety of content available on these platforms caters to different learning styles, making the learning process more enjoyable and fascinating [4]-[5]. The utilisation of these exceptional resources entails engaging in online interactions that are contingent upon the technical quality of the websites in order to effectively engage users and attain desired learning results.

According to [6], the technical quality of online resources is intricately linked to their accessibility and availability. In the study conducted by [7], a novel approach was presented for conducting a comprehensive assessment of website quality on a global scale. As per his perspective, technical quality emerges as a significant dimension of website quality

Fundamentally, websites that are inadequately designed have the potential to elicit user frustration, leading to a significant 'bounce rate' when visitors only access the main page without further exploration of other pages on the website. Conversely, the literature has indicated that a meticulously crafted website incorporating excellent technical features can have a favourable impact on user retention, as evidenced by higher revisit rates [8].

Since websites' quality is a key factor for users' acceptance and satisfaction [9], evaluating the quality of ELL websites will contribute towards accentuating their potential in supplementing language learning. Besides, this will highlight the credibility of these powerful resources among teachers and learners.

The rapid expansion of diverse automated evaluation tools has facilitated the expeditious inspection of the quality of websites. Although automated evaluation tools are commonly employed to enhance the user experience by assessing the quality of web pages [10], their application in evaluating the technical quality of educational websites is rather limited. Furthermore, despite their potential as educational resources, the significance and widespread adoption of ELL websites remain unexplained. Thus, this study addresses these two questions:

i. What is the technical quality of popular ELL websites?

ii. How efficient are the technical features of popular ELL websites in relation to 'Site Performance', 'Mobile Friendliness', 'SEO', and 'Security'?

2) LITERATURE REVIEW

Indeed, automated evaluation tools are widely used in evaluating websites as they provide quick results and suggestions [11]. These tools are used to improve the accessibility and usability of a particular website. For instance, in the research conducted by [12], the researchers conducted an exploration of the literature on accessibility studies related to COVID-19 vaccine registration and information websites (government websites) in Asian countries, which has been a relatively less explored area. The study has been conducted, drawing upon the WCAG 2.0 and 2.1 guidelines as the foundation. The evaluation encompassed the utilisation of automated techniques, namely Access Monitor and AChecker. According to the findings, it has been observed that approximately 62% of the websites have attained a satisfactory accessibility score. Furthermore, an analysis of these websites has revealed common errors, and the researchers have offered suggestions for improving their overall quality.

[13] conducted a different study that looked into website accessibility issues. Similar to [12], he utilised Achecker to evaluate the accessibility of three popular Arab e-commerce websites. The uniqueness of this study is that it employed five accessibility testing tools, including Achecker, TAW, Eval Access, MAUVE, and FAE.

The findings reveal that, compared to all the online tools used, Achecker is the most effective as it addresses the majority of accessibility guidelines. Besides, in examining the accessibility of the targeted websites, it is evident that common issues arise in the areas of navigation, readability, input assistance, and timing. These aspects play a crucial role in determining the overall accessibility of a website.

In the realm of accessibility evaluation, it has been uncovered that HTML possesses the ability to exert influence. Specifically, HTML errors have been identified as being synonymous with accessibility problems. Notably, [13] reported that certain websites were found to have a limited number of accessibility issues, as identified by specific tools.

[14] delved into both accessibility and usability evaluation by examining the universities' websites in Nigeria. Their research specifically examined the usability and conformity of these websites with the Web Content Accessibility Guidelines (WCAG 1.0 and 2.0). They employed three automated evaluation tools, namely the Web Accessibility Checker, HERA, and WAVE, to assess the usability of these websites.

The examination of website conformity with Web Content Accessibility Guidelines (WCAG 1.0 and 2.0) was conducted by the tools, which identified violations in the form of errors and problems. In light of the examination conducted, it is evident that each of the websites assessed exhibited a multitude of accessibility errors, thereby emphasising their lack of adherence to the Web Content Accessibility Guidelines (WCAG).

Significantly, most of the studies involving online evaluation tools focus on determining the usability of websites. For instance, the study conducted by [15] evaluated universities' websites, comparing the data obtained from SEOptimer and Nibbler. They conducted an evaluation of five websites using a comprehensive set of seventeen parameters from Nibbler and an additional five parameters from SEOptimer.

In conducting a comprehensive examination of various websites, it was observed that the majority of them exhibited an average level of quality. However, upon closer analysis, it became evident that a few websites excelled in specific aspects, garnering higher scores in those particular areas. The Caltec University website was evaluated and awarded a maximum score of 10 for its social aspect, while receiving a minimum score of 5 for its security aspect. Meanwhile, the Oxford University website achieved a maximum score of 10 in terms of SEO, social aspects, and security. However, it has received a minimum score of 5 in the performance aspect.

In line with [15], [10] used SEOptimer to examine a herbal cosmetic website. The study involved another two other automated evaluation tools, namely Website Grader and Qualidator to support the findings. The overall score obtained by the website was 70.4%. It was found that the usability aspect was reported to have the highest percentage (100%). This was followed by security (71%), social (50%), SEO (57%), and performance (56%). The comprehensive evaluation revealed that the cosmetics.com website necessitates enhancements in the areas of security, social aspects, SEO, and performance.

The combination of these three distinct online evaluation tools-Seoptimer, Website Grader, and Qualidator was also used by [16] to examine the various parameters that contribute to the quality of websites, which were derived from the evaluation criteria employed by the evaluation tools. These parameters include performance, mobile, SEO, usability, security, and social. The parameters were used to evaluate 10 agricultural websites. In the realm of website evaluation, www.sarkariyojana.co.in emerges as a prominent contender, garnering commendable scores in crucial areas such as SEO, usability, social, and overall performance.

In the evaluation of various websites, the highest grade awarded was an A-. In conducting a comprehensive examination of various websites, it is evident that their performance can be classified into distinct categories. These categories include C+, C-, D, D+, and F-. Unfortunately, it was found that none of the websites obtained a perfect score of A+. The study concluded by recommending that other website hosts enhance their websites based on the parameters that received lower scores, similar to the findings.

In parallel, [17] employed SEOptimer, Website Grader, and Qualidator as tools for assessing a particular selected website, which is the 'pit.ac.in'. Based on the data obtained, it can be inferred that the quality of the website was found to be average.

However, it was also identified that certain improvements are required to enhance its overall quality. The study conducted by the researchers highlighted the efficacy of employing SEOptimer, Website Grader, and Qualidator as tools to improve the overall quality of websites, aligning them with international standards.

Besides, the use of the three online evaluation tools is evident in the study conducted by [11], who examined the accuracy and effectiveness of the data reported by the tools. In their analysis, the researchers justified the accuracy of the obtained data by examining the performance of random websites through the utilisation of SEOptimer, Website Grader, and Qualidator. In their study, the researchers examined six key aspects, namely user friendliness, accessibility, performance, security, SEO, and social, to assess the quality of websites. Based on the assessment of the overall performance, it can be inferred that SEOptimer, Website Grader, and Qualidator demonstrate effectiveness as automated evaluation tools.

In the realm of evaluating websites, automated evaluation tools possess significant potential. Nevertheless, most of the studies conducted aimed at evaluating the accessibility and usability of government websites [12], ecommerce websites [13], business or product websites [10], universities' websites [14], [15], [17], agricultural websites [16], as well as a collection of random websites [11], their utilisation in evaluating language learning websites, specifically ELL websites, remains relatively limited. Thus, there is a pressing necessity to fill in the gap that gives rise to this study. The next section explains the overall procedure for this research.

3) METHODOLOGY

This quantitative study consists of two consecutive stages with different procedures. The stages are selection and evaluation.

Selection Stage

The selection stage (first stage) was conducted with the objective of determining the research sample. The pool creation process resulted in 67 websites which were included in the list as they appeared on the first and second pages of the Meta search engine. Since this study aims at evaluating the technical quality of popular ELL websites, PageRank (PR) tool was used to select ELL websites with greater importance or popularity.

According to [18], PageRank is an effective online tool to determine the popularity or importance of websites within the search engine. This is because it was initially designed to prioritise web pages in a keyword search [19]. PageRank uses ten levels to rank websites. Higher levels indicate greater importance or popularity of use. Thus, only websites with PR 4 and above, as shown in Table 1, were selected as the sample for this study.

Table 1

Number of ELL websites according to PR

PageRank (PR)	Number of Websites
5	8
6	8
7	4
8	3
9	1

Table. 1 shows the 24 ELL websites according to the PR.

Evaluation Stage

The evaluation stage (second stage) seeks to investigate the technical quality of 24 ELL websites. [20] define technical quality as the manner in which content and services are presented or made accessible to users. According to [6]'s interpretation, the focus lies on guaranteeing the desired functionality and compatibility of a specific website across

various devices. These concepts of accessibility, functionality, and compatibility which allow users to navigate websites effortlessly and independently, can be explained in four specific aspects: performance, device friendliness, availability within the search engine, and security of websites. The first part of the evaluation analyses the technical components in general while the second part zoomed into the features of each component.

As stated by [17], Website Grader is an appropriate tool to evaluate 'Site Performance', Mobile Friendliness', 'SEO', and 'Security' of websites. Thus, this study used an automated website evaluation tool (Website Grader) to evaluate the technical quality of the sample websites. The evaluation data gathered were analysed and discussed comprehensively. The comprehensive audit report for each website was examined, and the findings were organised into tables and charts. The collected assessment data was examined to assess the quality based on four technical aspects.

3| RESULTS

The technical quality of popular ELL websites

The first part of the evaluation focuses on the overall quality of ELL websites.

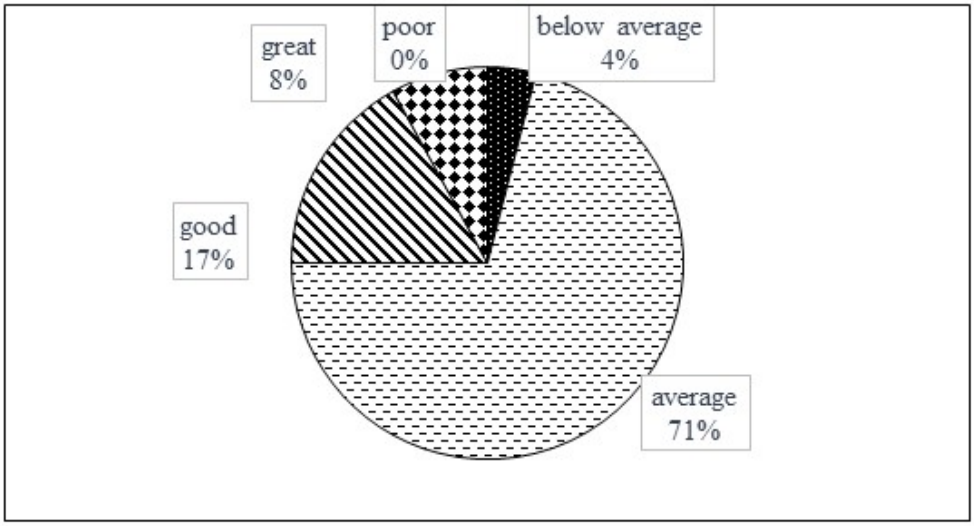
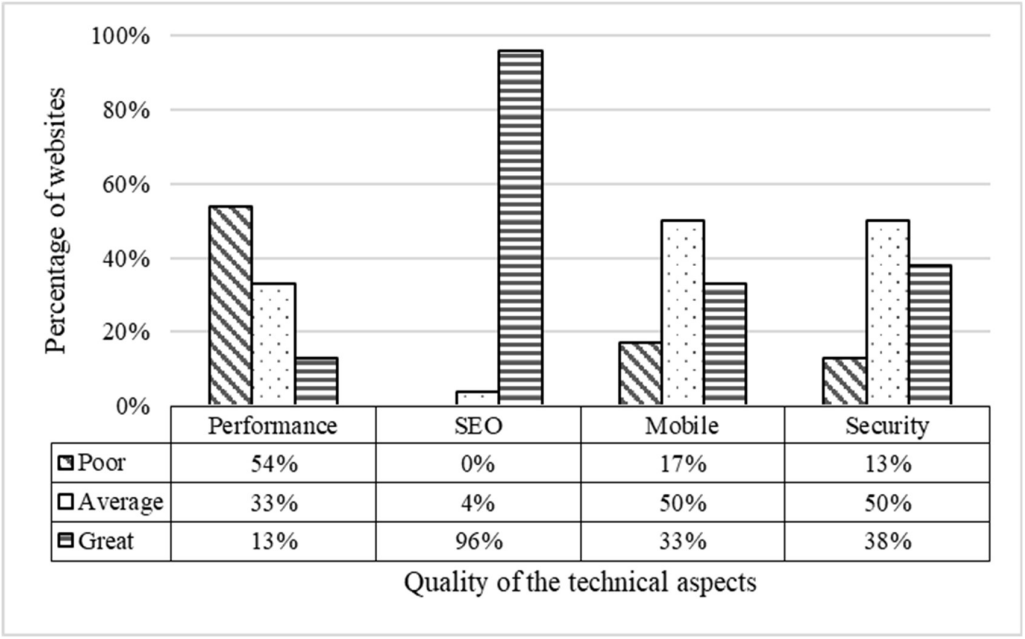


Figure 1(a) Overall technical quality

Figure 1(a) shows the overall technical quality of 24 popular ELL websites. The majority of the websites (71%) were reported as average in quality. 17% of the websites were reported as good, 8% great and 4% below average. Conversely, none of the websites were reported as poor.



	Performance	SEO	Mobile	Security
Poor	54%	0%	17%	13%
Average	33%	4%	50%	50%
Great	13%	96%	33%	38%

Figure 1(b) Overall technical quality with respect to the evaluated technical aspects

Figure 1(b) shows the technical quality of each technical aspect of the 24 popular ELL websites. In relation to 'Site Performance', 54% of the websites were evaluated as poor, 33% as average and the remaining 13% as great. In relation to 'SEO', the overall quality of 0% of the websites were evaluated as poor, 4% as average and the remaining 96% as great.

For the third aspect which is 'Mobile Friendliness', 17% of the websites were evaluated as poor, 50% as average and the remaining 33% as great. 13% of the websites were evaluated as poor, 50% as average and the remaining 38% as great.

The efficiency of the technical features of popular ELL websites in relation to 'Site Performance', Mobile Friendliness', 'SEO', and 'Security'.

The second part offers a comprehensive evaluation of each feature of the four technical aspects.

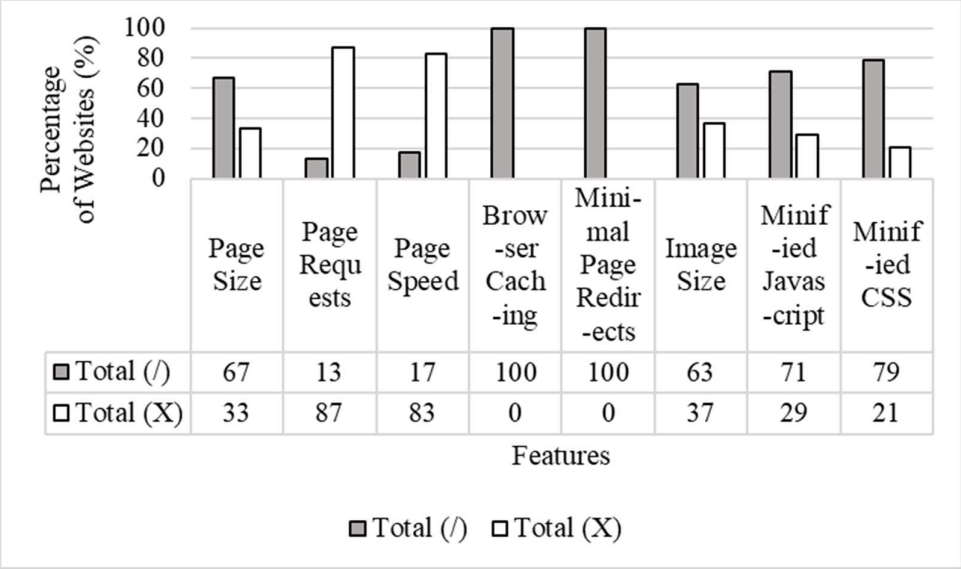


Figure 1(c) Efficiency of the technical features of 'Site Performance' aspect

Figure 1(c) shows the efficiency of the technical features of popular ELL websites with respect to 'Site Performance'. There are 8 features tested in the first aspect, 'Site Performance': 'Page Size', 'Page Requests', 'Page Speed', 'Browser Caching', 'Minimal Page Redirects', 'Image Size', 'Minified Javascript', and 'Minified CSS'. The Website Grader's evaluation report shows that amongst the 8 features associated with the 'Site Performance' aspect, 'Browser Caching' 'Minimal Page Redirects' are efficient in all websites. Over 62% of the websites met the criteria for four features. Meanwhile, more than 82% of the websites had issues with the remaining two features: 'Page Requests' and 'Page Speed'.

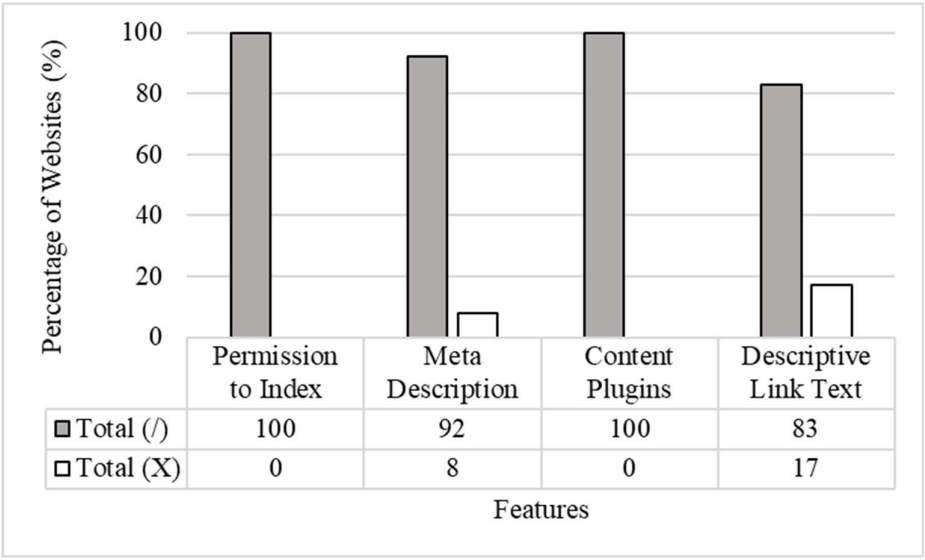


Figure 1(d) Efficiency of the technical features of 'Site Performance' aspect

Figure 1(d) shows the efficiency of the technical features of popular ELL websites with respect to 'SEO'. This aspect has four crucial features: 'Permission to Index', 'Meta Description', 'Content Plugins', and 'Descriptive Link Text'. Over 82% of the websites met the criteria for all four specified features. Among the four features, two ('Permission to Index' and 'Content Plugins') were efficient in all websites.

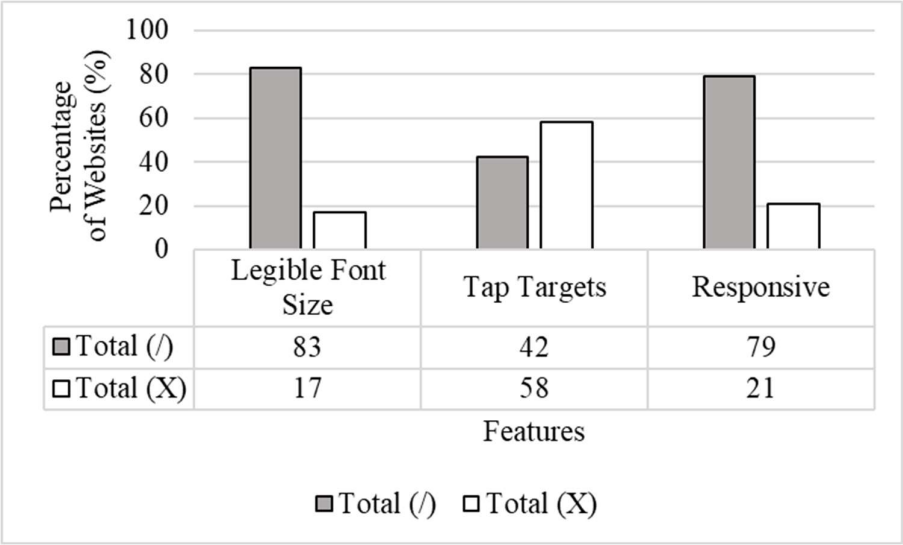


Figure 1(e) Efficiency of the technical features of 'Mobile Friendliness' aspect

Figure 1(e) shows the efficiency of the technical features of popular ELL websites in relation to 'Mobile Friendliness'. Three important features in this aspect are: 'Legible Font Size', 'Tap Targets', and 'Responsive'. Two features, 'Legible Font Size' and 'Responsive', were effective on over 78% of websites. However, 'Tap Targets' was considered troublesome on 58% of the websites.

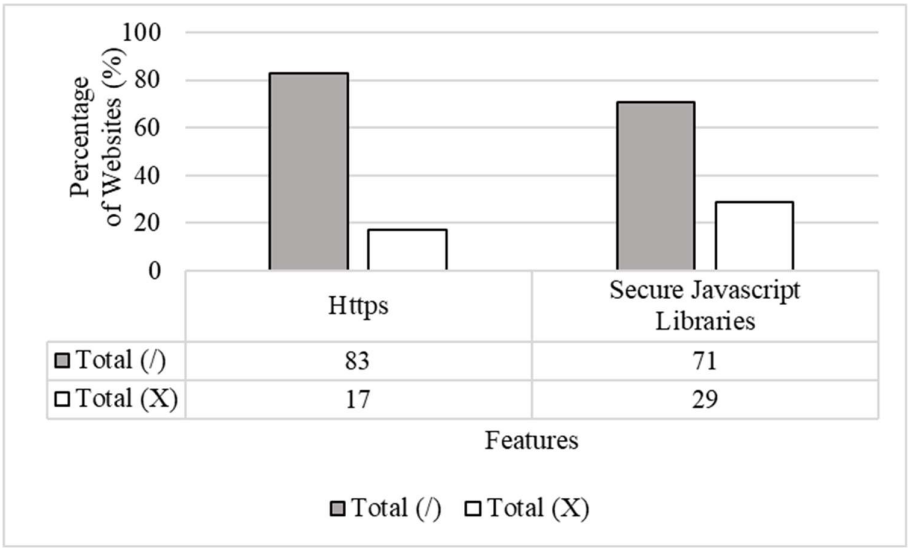


Figure 1(f) Efficiency of the technical features of 'Security' aspect

Figure 1(f) shows the efficiency of the technical features of popular ELL websites in relation to the fourth aspect, 'Security'. It has two crucial components: 'Https' and 'Secure Javascript Libraries'. 83% of the websites had excellent 'Https' feature and 71% had excellent 'Secure Javascript Libraries' feature.

4] DISCUSSION

In relation to the overall quality, majority of the sample were evaluated as average while none of the websites were reported as poor. Similarly, in a study conducted by [17], the website 'pit.ac.in' was assessed using Website Grader and found to possess an average level of quality. The abundance of ELL websites of ordinary to good quality highlights the significant potential of these valuable resources to enhance language instruction and acquisition.

Besides, the finding explains a positive correlation between the popularity of ELL websites and their technical quality, highlighting the significance of technical quality in determining the popularity of ELL websites among users. This crucial finding complements the findings of the study conducted by [21] who examined a sample of 25 Chinese ELL

websites. The majority of websites included in the survey were assigned PR4, PR5, or PR6. Based on the research conducted by [21], it is evident that there exists a negative correlation between the PageRank of a website and its English language competence level, indicating that as the PageRank increases, the proficiency level of users decreases.

Essentially, the tendency of ESL and EFL learners of selecting websites that have a lesser degree of English level as well as those with the presence of several educational options catering to a wide range of learners with varying learning requirements [21] reflects the need to evaluate not only the technical quality but also the pedagogical quality of these websites.

Of the four aspects examined, it was seen that 'SEO' and 'Security' demonstrated the highest level of effectiveness across the majority of websites. While SEO is effective for the majority of websites, it is recommended to optimise the website content for search on the remaining 25%.

In their study, [22] asserted that the advancement of Search Engine Optimisation (SEO) will enhance the ranking of websites on search engines, hence increasing their significance. Thus, it is imperative to enhance the search engine optimisation (SEO) aspect, which is one of the technical factors examined in the subsequent section of the research outcomes. This will enhance the website's organic traffic. In relation to security, it is observed that a website that possesses a secure SSL certificate and is devoid of vulnerabilities has become the prevailing criterion for assessing the significance and appeal of websites among individuals and search engines.

The most problematic aspect is the first aspect, 'Site Performance'. Nevertheless, it is crucial to note that the small ratio of efficient technical features to the problematic ones indicates the potential of the sample. Comparatively, the study conducted by [23] which involves a sample of five websites, reported ‘Links’ as more problematic aspect on all websites evaluated compared to 'Performance'.

Interestingly, only three out of seventeen technical features require significant improvement. Three features identified: two pertain to the domain of 'Site Performance', while another pertains to the facet of 'Mobile Friendliness'. A significant proportion of the websites were identified as presenting issues in relation to 'Page Requests' and 'Page Speed'.

In a similar vein, [22] ran a study utilising the automated software evaluation tool GTMetrix. Their findings indicated that the website was deemed poor in relation to its 'Page Speed'. Besides, a case study evaluating an ELL website conducted by [24], revealed the same concerns regarding 'Page Requests' and 'Page Speed'. According to Website Grader, to resolve issues concerning 'Page Requests' and 'Page Speed', it is advisable to decrease the quantity of HTTP requests and eliminate any superfluous images, scripts, or files. This will enhance website traffic and attract a greater number of potential customers.

These two issues ('Page Requests' and 'Page Speed') are critical as they will influence the suitability of the websites in the Malaysian context especially in sub-urban and rural areas. The selection of websites with the content which can load in low bandwidth will be beneficial for Malaysian learners.

Another prevalent issue is the 'Tap Targets' which was found as problematic on over 50% of websites is related. To resolve this problem, it is advisable to ensure that the links and buttons are spaced at least 8 pixels apart from each other and have dimensions of at least 48 pixels in width and 48 pixels in height, enabling mobile users to click on them.

5] CONCLUSION

The aforementioned insights provide website hosts with helpful ideas about the limitations and pressing necessity of enhancing the quality of their websites. This is crucial in order to guarantee accessibility for all pupils, irrespective of their individual characteristics as well as the time, location, and gadgets they use. The findings of this evaluation provide an understanding of the efficacy of automated evaluation tools for assessing language learning websites. As not all websites with high PR are great in terms of their technical quality, this study informs researchers of the vitality of investigating the relationships between PR and technical quality. Moreover, this initiative significantly contributes to the advancement of online learning in Malaysia by drawing attention to the potential of English Language Learning (ELL) websites as a means for teachers to offer authentic English language learning opportunities.

6] ACKNOWLEDGEMENT

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7] FUNDING STATEMENT

The authors did not receive financing for the development of this research.

8] DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author.

9] CONFLICT OF INTEREST

The authors declare that there is **no conflict of interest.**

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