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EVALUATING USER ENGAGEMENT AND READING BEHAVIOR ASPECTS OF WEB VISITORS BY ANALYZING INDICATORS ON GOOGLE ANALYTICS DATA

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Abstract— Web-based technology is used as source of information and marketing even in educational institutions. This development unintentionally changes reading patterns, from paper to online media. However, user engagement and reading behavior are often overlooked while developing the website. Understanding these two pillars can help the improvement process become more effective. Politeknik Caltex Riau has an official web provides information on campus life and study programs for prospective students. The information is clear and precise, yet there are many repeated questions. By that, the process of understanding the problems, determining parameters, implementation, data collection, and analysis is carried out. Evaluation is necessary to understand demographics, engagement, behavior, and events by implementing Google Analytics. From implementation, 49% of readers are aged between 18-24 years old, included in the category of actively searching for a university. The smartphone is used by 56% of total readers on the website. From evaluation, it is known that most readers do not read the content thoroughly. It can be seen from the total scroll event, which is high at the beginning and keep decreasing while scrolling down the page. But the bounce and sessions number keep rising. This phenomenon shows that the reader's engagement is shallow, and reading comprehension is vague. There is also an indication of the effect of a smaller screen size with an increase in bounce rate of almost 50% compared to a large screen. Thus, further studies can focus on deepening and evaluating web design and evaluating more indicators provided on Google Analytics.

Keywords: User Engagement; Reading Behavior; Google Analytics; Website, Online Articles

Intisari — Teknologi berbasis web kerap digunakan sebagai media informasi dan pemasaran oleh berbagai pihak, seperti institusi pendidikan. Hal ini seiring dengan perubahan pola baca masyarakat yang beralih pada media online. Akan tetapi, keterlibatan pengguna dan kebiasaan dalam sebuah sistem berbasis website cukup sering diabaikan dalam pembuatan sistem. Padahal, dengan memahami kedua hal tersebut dapat membantu proses perbaikan sistem menjadi lebih tepat sasaran dan efektif. Kampus Politeknik Caltex Riau memiliki web resmi berisi informasi kehidupan kampus dan pengenalan program studi bagi calon pendaftar. Informasi yang diberikan cukup lengkap dan jelas, faktanya masih menimbulkan pertanyaan berulang. Dengan memperhatikan masalah tersebut, maka dilakukan proses pemahaman masalah dan penentuan parameter ukur, implementasi, pengumpulan data dan analisis data tersebut. Evaluasi diperlukan guna memahami ketepatan target pengunjung, keterlibatan dan kebiasaan dan aksi pengguna dengan mengimplementasikan Google Analytics pada web. Dari hasil implementasi diketahui bahwa target pengunjung rentang usia 18-24 tahun adalah sebesar 49% dari total pengunjung, dimana usia tersebut masuk kategori pelajar yang mencari universitas. Sebanyak 56% pembaca diketahui menggunakan ponsel untuk mencari informasi. Dari hasil evaluasi diketahui bahwa sebagian besar pembaca tidak menyelesaikan bacaannya. Realita ini terlihat dari total event scroll yang hanya bernilai tinggi diawal tetapi nilai lompatan dan sesi juga tinggi. Fenomena ini menunjukkan rendahnya keterikatan pembaca terhadap konten yang disajikan dan pemahaman bacaan cukup diragukan. Terdapat juga indikasi pengaruh ukuran layar yang mengecil dengan meningkatnya angka lompatan hampir 50% daripada ukuran layar besar. Dengan demikian, studi selanjutnya dapat berfokus pada pendalaman dan evaluasi terhadap design yang disesuaikan dengan ukuran layar.

Kata Kunci: Keterikatan Pengguna; Kebiasaan Membaca; Google Analytics; Website; Artikel Online



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INTRODUCTION

The vast development of technology has had a considerable impact on the development of information and communication in society, causing changing patterns of character and culture of people. One example that has been affected by the advance in technology is reading behavior. The presence of the internet globally in the digital era makes it easier for people to get online access through web portals. With the change in this practice, the reading interest and information understanding can no longer be measured by how many books we have read but should be analyzed through the number of contents, engagement, and reading behavior or event obtained by evaluating online media [1].

Young generations tend to be more interested in reading online articles than printed media such as books, magazines, and newspapers [2]. The change behavior towards digital media allows researchers to figure out the extent to which readers are attached to an online article [3]. Not many online readers read through an entire article, especially one that provides lengthy content. One factor is the influence of interest or increased interest in reading content that is considered attractive [4]. This behavior causes dissemination of information to be inadmissible. Several factors drive the decline in literacy levels among online readers, including heavy topics and extended content. Long content may attract less interest in people to complete their reading, or some may choose to only focus on certain parts of the story [5]. The design of the article page display that is less attractive is also very influential. When reading activities are carried out using smartphone devices, the light produced by the smartphone screen could easily make the eyes tired, primarily if the content text uses a relatively small font size. Imagine when a reader has to read an article using a handphone with limited screen size and a bad design. This thing could lead to a decrement in the reader's interest.

Visitors' attachment to web content is one indicator of the success of information delivery and one of the marketing strategies. In this case, the Politeknik Caltex Riau (PCR) utilizes various media to interact with the community, especially with prospective students, using the website, Instagram, and other social platforms. The official website, https://www.pcr.ac.id, provides various kinds of news related to study programs, activities of the academic community, prospective students, and sharing information on multiple achievements that occur on campus to the public. Looking at the variance information presented and how to detail the student registration instruction posted on the

website, the most minor repeated questions are expected, especially from future students. The fact is that when the registration process opens, people keep asking the same questions even though readers can find the information on the site easily. As a result, the admissions team has to explain the same information to applicants who ask questions step by step. This reality shows that the information is not appropriately conveyed to the reader. Consequently, some questions arose about whether the website hit the target audience, whether the design is attractive enough for readers to keep surfing, how deep the content attachment of the users, whether the people read the content while opening the page, etc.

Therefore, understand to why phenomenon exists, the study focuses on analyzing users' engagement with the PCR web portal and their behavior as an initial identification of the problem. The analysis will be carried out to identify the distribution of visitors, demographics, devices, content attachment, and the behavior of web portal readers. This information is needed to determine which factors influence the reading interest of web visitors. Hence, we could better understand which part of the problem is. The result is later used to determine whether the problem is caused by unattractive content or unsatisfactory information design. Thus the aspects that need improvement can be evaluated. The analysis in this study uses data sourced from Google Analytics embedded on the official PCR website. In addition, the research also uses a new event such as scroll tracking that is installed for a certain period to measure the behavior of portal visitors.

Literature Reviews

The author uses references from several existing studies to support understanding and guide the study. Online reading media get specific treatment when compared to physical books. Based on research [5], no direct relationship has been found between the length of the article and the reading interest of the web visitor. Nevertheless, there are two categories of reader engagement on the website there is shallow and deep engagement. Shallow engagement is when visitors read less than 50% of the entire article. When a visitor reads more than 50%, the reader has got the gist of the article and has accomplished scrolled through the web page. Another study was conducted to measure the reading patterns of internet users for five types of documents, namely journals, news, magazines, written texts, and brochures. Based on the research results, it is known that readers prefer to read journals in the form of printed documents, while the other four papers are selected to be read online [6]. Despite that, a recent study on thousands of

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students and focus groups of six secondary schools on enjoying reading printed and digital materials shows exciting results. The teenagers were fond of physical books initially but preferred online reading as they got older. This habit influences content preference in online reading behavior later on [7].

Another study also shows a relation between the online content provided and the high interest of online readers, such as news, sports, culinary, etc. This relation is known based on the click habit on websites that create different patterns. Hence, even though several information choices are provided or even recommended on sites, the readers will choose articles that attract their interest [8]. Additionally, the study on the design side shows a significant effect when using small fonts on the content. Text that uses small letters and wide display causes reading ability to decrease. This fact indicates that the proper typography design has a considerable impact on the ability to read [9]. One tool used in this research is Google Analytics (GA), which provides free quantitative data for analysis. This tool is mainly used to evaluate content performance, behavior, and user attachment in numerous forms to decide on marketing strategy or evaluate the platform for improvement [10, 11]. Hence, the analysis of user engagement and behavior on the official website is necessary as a preliminary study to identify the reading interest of online readers.

MATERIALS AND METHODS

The website used for this study contains news and information about the institute that is presented mainly by the text. As this web is the official website, thus the main objective of the web is to post achievement news and more information for prospective students. The length of the text for each article is about 250-800 words, including figures captions on average. The usage of Google Analytics as the tool is proposed and is embedded into the website that automatically applies to all pages on http://www.pcr.ac.id. The tool collects data related to webpage traffic in various variables. In this study, we used several indicators related to user behavior to measure visitors' engagement with the platform. The outcome is to be analyzed for further discussion.

Indicators

1. Demographic

Analysis of demographics is vital, especially for this research, as it is a study of several factors, such as age, sex, race, etc., based on population. Demographics analysis is often overlooked, which is regrettable since it contains many aspects that could support the growth of research and understanding of the target by various variables

[12]. It is essential to ensure whether the audience of the webpage hits the mark as its impact will affect the output, and also necessary to design a marketing strategy.

2. Device Category

One other variable that shall be considered is recognizing which type of devices are used to open the website and read the articles. According to a previous study, reading through mobile devices could speed up reading behavior and reduce reading comprehension [13]. Therefore, to ensure that the reader understands the information conveyed, it is necessary to know what type of device is used; developers could serve thus better approach and analysis. Besides, knowing the commonly-used device to access pages can be used as a reference for better web design and typography.

3. Event and Session Duration

Duration is one approach to evaluating the users' engagement with the content on the website. By collecting and analyzing the duration per session and per pageview, the readers' attachment to the article could be measured and discussed later. To understand the reader's activity on a website, an analysis of scroll events is required. Scroll Tracking is implemented to examine the reader's behavior toward the articles and how far the reading activity is recorded. This feature allows splitting the articles into some part of percentage, e.g., 10%, 20%, etc. Accordingly, we could measure the length of the reading article.

Data Collection Technique

The data collected by Google Analytics is used as initial data and could be used as the primary indicator to execute future research. Google Analytics has been installed on the PCR web portal for about a year, starting from the beginning of January 2019 to December 2021, with the help of the PCR technology center team to identify reader behavior and engagement. Scroll tracking as one of supporting parameters is added. We implemented the Scroll Tracking event to Google Analytics Tag Manager to get the scroll percentage done by readers on the visited web pages. The period of collecting data is carried out for almost two years to identify the data trend in detail. Some of the Google Analytics features collect data such as summaries of web usage, demographics, behavior, devices used, and events during the data collection period. Additionally, scroll tracking is also a unique feature that allows web owners to monitor to which extent the readers are doing the read activities. For example, for an article page with a length of about 20 cm, the owners could implement a scrolling feature to divide the web page into specific percentages such as 10%, 25%, 50%, 75%, and so

on. In this way, the extent to which users have read articles as long as 20 cm can be obtained [14]. Therefore, to identify behavior, scroll tracking is needed.

RESULTS AND DISCUSSION

This section explained the analysis of engagement and behavior of visitors according to several criteria, such as demographics, devices, duration, and scrolling action.

Demographics

According to information collected regarding demographics, around 50% of web visitors are approximately 18 to 24 years old. The second position is dominated by the age range of 25 to 34 years for about 30% (Figure 1) and the rest is divided into several age groups. The number of visitors based on gender was almost equal for both men and women. The majority of visitors were men, about 52.8%, and the rest were women.

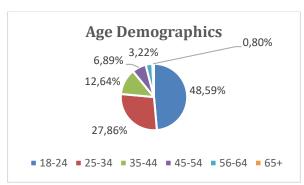


Figure 1. Visitor Age Demographic

This result aligns with the expected target of the web, which is to attract prospective students and the wider community who pay attention to the institution's development. The average age of children entering elementary school is 6-7 years. Hence students would be 16-17 years old when entering high school. High school students should have started searching for information about the campus they are interested in when joining the 3rd grade of high school, around 18 [15]. That way, this result can be said to meet the target audience's expectations because the majority of web visitors are in that age range (18-24 years old) that are looking for information on university admission.

Session Duration

In line with the previous finding, it is also known that the mainly accessed pages are the profile of the study program at the Polytechnic of Caltex Riau. The information presented on the profile page emphasizes the competencies offered in each existing study program. This result aligns

with the reader's interest to perceive more details to decide on enrolment. Both old and new visitors of both genders opened about two to three pages in one session. The average spending time that occurs is around 2.37 minutes in one session. The spending time stated above is more than sufficient to understand the most part presented on the website to establish comprehension. However, by referring to the rise of the session number, it seems that the reader opens the page and is idle for at least half an hour before the session restart. This is the cause of an increase in the number of sessions on the PCR website, around 131,327 sessions according to age demographics.

Based on a previous study related to reading behavior, people can read around 230 English words per minute for non-fiction works using the silent reading method [16]. Nonetheless, that number would slightly differ concerning the readers' mother language, and the study above was conducted on English speakers. In another study, the number of words and reading time per minute with a similar estimation could also apply to Indonesian speakers [17]. Hence, we can conclude that short to medium length of articles containing around 150-250 words in both languages can be finished in more than a minute without considering their comprehension.

Table 1. Time needed per reading session

			O
No	Duration Session (s)	Session	Pageviews
1	0-10	64.743	68.826
2	11-30	16.338	26.093
3	31-60	10.532	22.407
4	61-180	14.126	45.582
5	181-600	10.690	56.568
6	601-1800	7.096	48.324
7	1800+	2.030	32.048

For this study's purposes, it has been identified that most of the articles on the PCR website contain more than 250 words on average. Meanwhile, based on Table 1, it was found that there were around 64.743 sessions that occurred in a reasonably short time which is less than ten seconds. In line with that, the pageviews number is also relatively high. The high session usually means that visitors of the website are more likely to stay idle (no activities or events) on one or several articles for minutes or reload the pages over time. Following that, it is safe to consider that the reader might not read the entire article or fully understand the contents in a short amount of time. The behaviour identified referring to this data is that the readers only try to search for specific information or keywords and probably miss other points. In addition, it is also known that each user does not focus solely on a single page for a certain amount of

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time. To sum up, the attachment between readers and the news posted on web pages is relatively low. The reader opens for at least two pages per session in less than 10 seconds which is impossible unless you only look for specific info. If referring to previous research about the minimum time we need to comprehend the text thoroughly, a good reading session should be above 60 seconds, thus the engagement result is quite disappointing.

Device Category

Derived from the data, 4,221 out of 7,398 (56.84%) web visitors mostly used mobile devices to access this site. 42.89 percent of users use computers or tablets. We then explore the bounce session for each device in more detail. In Figure 2, the overall bounced rate percentage is 33.72%, which is considered a reasonably good number for more comprehensive screen users [18]-[20]. On a smaller screen, on the other hand, although around 60% is still considered an acceptable number, the percentage of bounce activity on smartphones is quite concerning. The number rocketed to 65,91%, twice as much as the bounce rate on other devices. This result means that thousands of users left only a single engagement hit. The trend seems quite different practice from users of desktop devices.

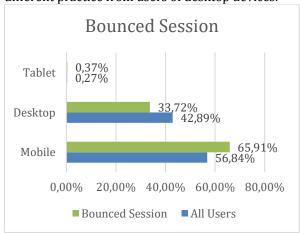


Figure 2. Bounced session on each device category

Typically, web page readers find it easier to surf the web portal by using larger screen devices due to the broader exploration area, and the design will be adjusted. The font size visible is more prominent on the more extensive devices, increasing the text's readability [13]. Aside, users could easily open multiple web pages in a session. Meanwhile, with the means of smartphone usage, behavior changes. Most users need information with fast and straightforward movements, so the activities to explore the news sites tend to be limited. The expected behavior could be unachieved when the information on the mobile page is presented using poor design and typography. It

makes visitors bounce immediately without event. In this case, it is shown in the percentage of mobile bounce in Figure 2.

Table 2. Device Screen Resolution

No	Screen Resolution	Users	Bounce Rate	Pages/Sessions
1	360 x 640	19.847	35.48%	2.12
2	1366 x 768	13.182	25.87%	3.05
3	360 x 760	6.474	34.76%	2.10
4	360 x 720	3.412	35.37%	2.20
5	360 x 780	3.130	30.21%	2.23
6	375 x 667	2.876	37.32%	2.07
7	1920x1080	2.690	19.28%	3.61
8	412 x 892	1.993	30.28%	2.15
9	360 x 800	1.972	30.39%	2.17
10	414 x 736	1.920	33.10%	2.10

While digging into more detail by comparing the screen resolution, the result follows. According to the result in Table 2, two models of screen size are compared, the larger (no. 2 and 7) and small screen size. Based on the data analysis, devices with limited screen size could be a reason that also affects the bounce rate and the number of pages, albeit less significantly. The higher percentage for bounce rate is around 37% while using 375x667 pixels, but it is reduced by half of the latter by only 19% for the larger screen. However, the result indicates that users are somewhat encouraged to leave the page immediately after the goal is obtained while reading using smartphones rather than desktops. Given that information, the percentage of a bounce rate increases when the screen size gets smaller. Note that this indicator is yet to consider reading comprehension and what the leading cause of that behavior would be.

Scrolling Events

Scrolling activity is closely dependent on the length of content displayed on the screen. The scrolling action and behavior vary between reading through a desktop and a smartphone due to the limited screen size. By using a desktop, the space for content becomes wider. The header of the web could take up approximately 10-15% of the page length that is displayed to the reader. Using a computer device makes it safe to assume that the screen size can display the entire information on a screen (100%). In contrast, smartphone size will shrink and construct a more extended scroll area due to adjustments to the website mode. Then to get the content visible on mobile phone, readers should do scrolling activity a bit more to at least 15-25% of the length of the page and reach 60-90% to finish the article.

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Table 3. Events per Action

No	Event Action	Total	Unique Events	
	(% Scrolled)	Events	Onique Events	
1	10 %	111.291	89.528	
2	25 %	88.796	73.892	
3	35 %	75.637	64.332	
4	50 %	58.549	51.106	
5	60 %	46.091	41.418	
6	70 %	37.321	34.061	
7	90 %	22.910	21.332	

Based on the tracking results in Table 3. Events per Action, the total events that hit 60-90% of scrolling are 21 to 41 thousand unique events. Therefore, we can say that the occurrence to finish the article is only left around a fifth of the whole event and half of the unique circumstances at the beginning. Most readers are bounced out after opening a particular page without doing a single hit activity such as scrolling. Thus this one behavior could also be identified as shallow engagement.

Table 4. Action behaviour per device

Event Action	Mobile Tablet Traffic		Tablet Desktop Traffic	
(%	Total	Unique	Total	Unique
Scrolled)	Events	Events	Events	Events
10 %	69.548	55.636	42.040	34.128
25 %	53.743	44.905	35.305	29.187
35 %	47.161	39.846	28.692	24.666
50 %	33.803	29.369	24.926	21.891
60 %	24.038	21.786	22.203	19.763
70 %	19.203	17.553	18.239	16.612
90 %	11.013	10.251	11.981	11.151

From the scroll tracking results in Table 4, the readers' behavior diverges depending on their device. As we already know from the information above, most readers use smartphone devices. The total scroll events that reach up to 50% of the content area are only about half of the initial number. In sum, only a small number of readers finish reading the article in total length. Nonetheless, by looking at the result, it is intriguing to see that the number of unique events of both device type that reaches 70-90% of the page is equally even, meaning that the site has some loyal readers that scroll through the page perhaps to read the articles.

CONCLUSION

The author can conclude several points according to the conducted study. First, the readership target of the official web is on point, which is dominated by teenagers aged 18-24 years old. As the visitors around this age were so into information about admission, the page that opened the most was the study program for each department. They spend more than two minutes on that specific page. Nevertheless, the session rate

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says otherwise. The session number is rocketed to a hundred thousand, meaning that most readers stayed idle with zero activity for an extended period on a specific page and restarted the session. Though spending time is enough to finish the article, that does not guarantee the reader can understand the content thoroughly.

Second, according to the table above, the distribution of information might still not be optimal due to the size of the screen that affects the web design. The website lost more than half of the readers before the scrolling event reached 60% of the page on the mobile phone. This event indicates that half of the readers stop scrolling by half of the content and are more likely not to continue reading and finish the articles. This action could also imply that mobile phone readers only look for certain keywords or specific information before leaving the page. Hence the engagement with the content is pretty low, and the reader could miss the vital information by not finishing reading the articles.

Last, by knowing the age demographics, it is expected that young visitors mostly use a mobile phone to surf the website. Therefore, it is necessary to consider future research related to the display adjustment and typography on the website. Even though the impact was not significant, referring to the result, there might be a hint of the relation between screen size that affects the user's reading behavior and comprehension. The improvements in that focus area are needed to provide better design and leverage information delivery to visitors.

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