

Digital Visual Selective Attention System (VSAS) Platform Based on Sociotechnical Design to Encourage Communication and Democratic Participation in Indonesia

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Abstract

Demonstrating attentive behavior when users decide to share information on social media is vital. Such attentiveness helps users more effectively identify misinformation, allowing them to avoid being misled by hidden deceptive content. The rapid increase of information in online media today means that the dissemination of misinformation can have serious negative consequences, such as threatening political stability and democracy, which can lead to societal divisions. While many studies have investigated the traceability and prediction of misinformation spread, additional research is necessary to understand and prevent the disruptions in human attention that contribute to this issue. This leads to questions about how technological interventions can enhance user awareness during the decision-making process of sharing information, especially to promote honest and constructive communication in a democratic context. The objective of this research is to examine and intervene in the factors of user attention when sharing information online, particularly regarding communication and democratic participation in Indonesia. This study employs a mixed-methods design, combining both quantitative and qualitative approaches. It is structured into two phases: Study 1 involves an investigation into the importance of attention factors in social media sharing through a self-report survey with adult participants from Palembang. Additionally, in Study 2, we designed and tested a Visual Selective Attention System (VSAS) using a Sociotechnical Design approach to influence decision-making by implementing an attention-focused design. We hope that the future development of interactions within a VSAS-based social media application will yield sustainable insights that encourage a non-coercive approach to managing the sharing of misinformation, thereby supporting transparent and fair communication and democratic participation in Indonesia.

Keywords: visual selective attention system (VSAS), sociotechnical design, democratic participation, communication, misinformation.

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1. Introduction

The practice of designing digital platforms for citizen participation and democracy can be carried out through a multidisciplinary-based Sociotechnical Design approach that is combined into design reflection on issues of theory and practice of democracy, legal and political science (Damodaran et al., 2005; Rapoza, 2021). The debate about democracy, democratic procedures, and participation in digital systems design has attracted the attention of researchers for two decades (Bjørn-Andersen & Clemmensen, 2017; Bødker et al., 2000). These researchers seek to articulate design patterns and evaluation tools for these systems with a general perspective on the democracy of defensible processes. The broader literature in various scientific disciplines connecting general questions about the theory and practice of social democracy with specific procedures and instruments has not produced much consensus at the scientific level. Evidence of the multidisciplinary nature of design problems related to these systems can be seen in the literature review by Nelimarkka (2019), for example, who understands participatory design from the catalog of deliberation, representation, and decision-making procedures that Vlachokyriakos (2013), for his part, associates with the institutional political framework of contemporary Western world democracy. Nelimarkka (2019) does not discuss the diversity of democratic procedures or the conditions for their implementation. The political institutional environment is also not the only thing that makes it possible to carry out democracy. Little attention is paid to its implementation in the business, professional and educational fields (Amin et al., 2021; Zizlsperger, 2012).

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Therefore, it is very necessary to add design issues related to democratic practices in action (Kim, 2012) resulting from platform empowerment to support these goals, especially in social network-based applications. Citizen participation systems that pose particular problems are related to usability and user experience. “Users” here are institutions, companies, formal and informal collectives, and subjects who interact with the platform. Thus, issues such as the legality of decisions taken on these platforms and subjective trust in their general function of sharing information are very important considerations for design (Li et al., 2014).

The ability to openly share and discuss topics online has helped give rise to the open development of social media applications (Liu et al, 2014). The convenience that supports users in using social media applications increasingly triggers them to share information more quickly and openly. However, this also triggers information sharing behavior on social media, which should occur only when users demonstrate attentive behavior so that valuable information can be consumed constructively, and any potential harm latent in misinformation can be identified and ignored. As an indication of the extent of this problem, a recent study from Gabelkov et al. (2016) revealed that 59% of links on Twitter were shared by users without even reading them.

Several technological innovations have been developed to date, one of which was developed by Facebook which relies on algorithms to detect false information (Kim et al., 2012). However, approaches that rely on robot-based applications need to be reviewed by carrying out additional “hybrid” integration with the Sociotechnical Design approach, and including especially considering the psychological factors of human decisions. This is in line with research by Vosoughi et al (2018) where they found that the spread of false information was carried out more by humans than by robot-based applications. This shows that the spread of false information on social media requires a lot of collaborative study and research that can understand human decision factors, especially in the context of democratic communication and participation at the state level. Other studies (Vosoughi et al., 2018; Cook et al., 2017 & Bakshy et al., 2009) encourage the investigation of human judgment factors using a Sociotechnical Design approach. Osatuyi et al (2013) state that human behavior provides more dissemination of misinformation and truth than automated robot applications. This suggests that misinformation containment strategies should also emphasize behavioral interventions, such as labeling and incentives, to prevent the spread of misinformation, rather than focusing exclusively on and relying on bots. In line with several issues regarding the complex dimensions of handling the spread of misinformation, including labeling, economic motive incentives, regulations, data transparency, and ethics in communicating on social media to support democratic communication and participation in a country (Vosoughi et al., 2018).

2. Research Method

The Sociotechnical Design method is an approach to designing a digital platform that considers human, social and organizational factors, as well as technical factors in organizational system design. Sociotechnical Design is intended to ensure that the technical and organizational aspects of a system are considered together. The result of applying this method is a better understanding of how human, social and organizational factors influence the way that work is done and technical systems are used. This understanding can contribute to the design of organizational structures, business processes and technical systems. Although many developers realize that Sociotechnical Design issues are important, Sociotechnical Design is very rarely used. The reasons there are not many are, primarily, the difficulty in using the methods and the disconnect between these methods and both technical demands, and the problem of individual interaction with the technical system.

Data collection in this study used non-probability sampling with a purposive sampling method. The sampling method uses predetermined criteria such as age range and user activity on social media. The instrument used was an online questionnaire. This question determines the influence of attention behavior in sharing misinformation on social media which is supported by the Sociotechnical Design approach. Questions consisted of demographic information including gender, profession, age, education, and frequently used social media platforms. For each type of question, respondents were asked to indicate their concern about sharing certain types of information on social media. Respondents were asked to choose the most appropriate item using a 5-point Likert scale. This question relates to whether users agree or disagree whether attention factors play an important role in the context of information sharing behavior on social media.

One of the questions is to construct whether users agree whether users share information on social media without attention behavior just by reading the title without understanding the content of the information context. Study 1 was conducted with a sample of several participants in Palembang City. In the VSAS User Experiment, we conducted a pre- and post-test intervention with two sessions over two weeks to see if we could observe changes in users' decision

behavior in sharing information especially in the context of encouraging LUBER and JURDIL principles of democratic communication and participation in Indonesia. We designed and experimented with a system called “Visual Selective Attention System (VSAS)” that implements an attention-based design approach in user interfaces. We designed and built a VSAS system similar to the social media application WhatsApp. We build a VSAS system using Android Studio 4.1.1. and the languages used are JAVA and XML. We use Firebase real-time database as cloud storage and database management. The user interface design in VSAS is based on a mobile application using spotlight and zoom-lens techniques. This attention-based design will also be developed through a Sociotechnical Design approach to intervene in users' decisions when they decide whether to share information or not in a context to encourage the principles of democratic communication and participation.

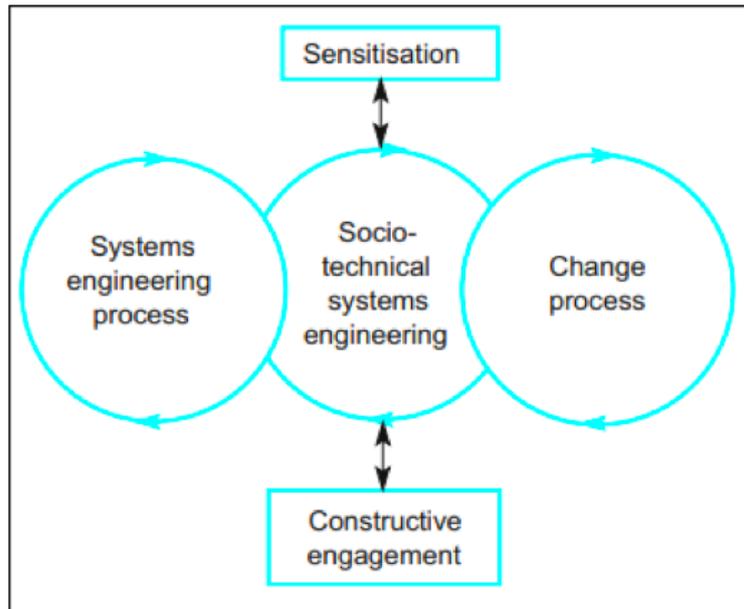


Figure 1. Socio-Technical Systems Engineering.
Source: Baxter & Sommerville, 2011

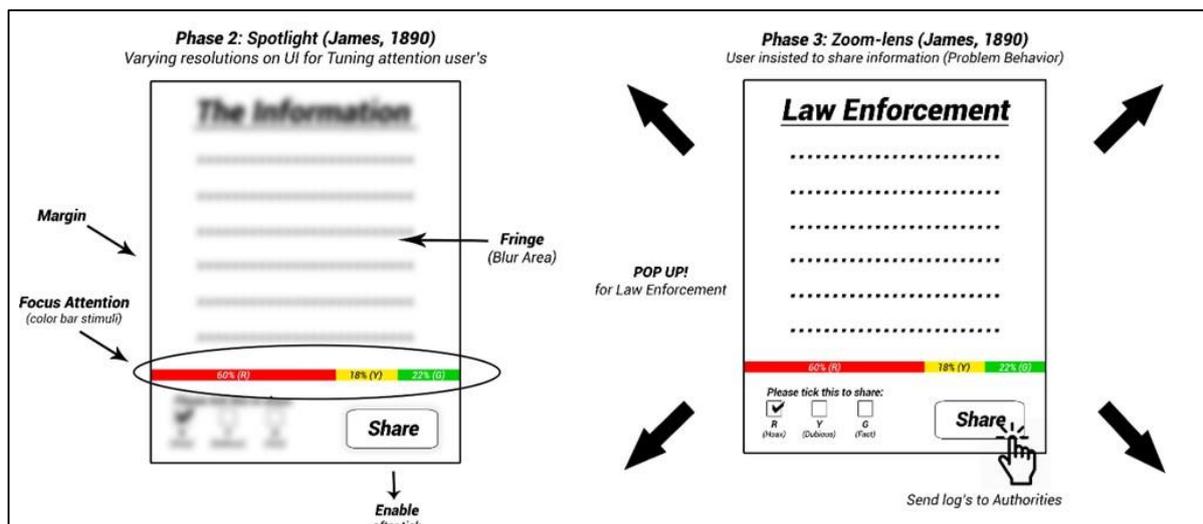


Figure 2. VSAS wireframe design uses highlight techniques and zoom lenses

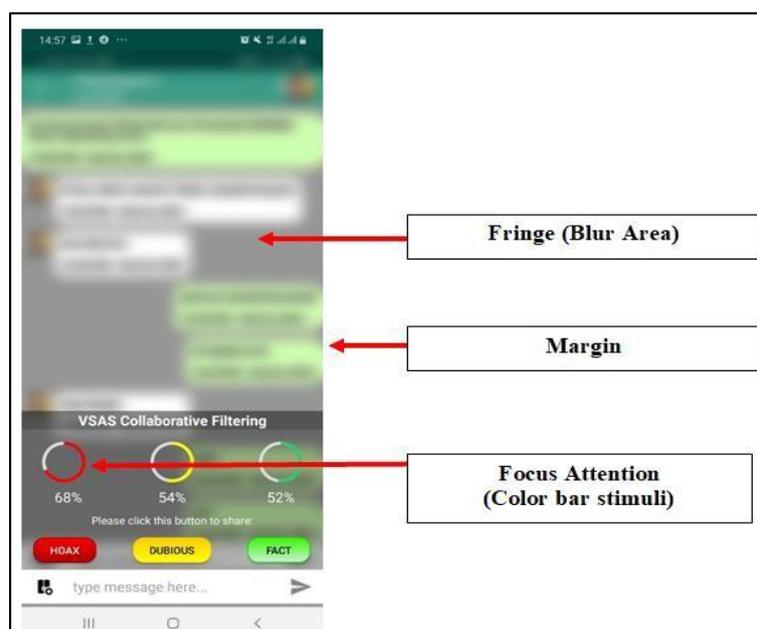


Figure 3. Detection based on mass intelligence in VSAS

3. Result

Before the questionnaire was distributed to all respondents, a questionnaire trial was carried out by distributing the questionnaire to 77 respondents. A total of 77 respondents were selected on the grounds that this number was all the respondents to be addressed. This trial was carried out by testing the level of validity and reliability of the questions asked in the research. A question item is said to be valid if the r number is greater than 0.3, while a measuring instrument is said to be reliable if the measuring instrument is able to provide a steady measurement according to what it has measured and to what extent the measuring instrument is the same as itself (consistency). Testing of the level of reliability of the questionnaire in this research was carried out using one of the statistical data processing computer program packages, namely SPSS Version 25 using Cronbach's alpha. A variable is said to be reliable if the alpha coefficient is greater than 0.5. The results of the reliability test can be seen in the following table. The results of processing validity tests and reliability tests on the question items will be presented in the table below. Apart from validity and reliability tests, data normality tests were also carried out. The purpose of carrying out a normality test is to find out whether the regression model, dependent variable and independent variable both have a normal distribution or not. A good regression model has a normal or close to normal data distribution. The data normality test was carried out using SPSS Version 25 calculations with the Kolmogorov Sminov test, so the data can be said to be normally distributed if the K-S value is $<$ from the K-S table or if the value is $>$ than alpha.

3.1. Descriptive Percentage Analysis

To provide an overview of the Media Literacy Variable in issue of Presidential election, which is divided into four dimensions: Dimension of Function Consuming (X1), Dimension of Critical Consuming (X2), Dimension of Functional Prosuming (X3), and Dimension of Critical Prosuming (X4), as well as the variables of input awareness, output awareness, and information reception regarding the 2024 Presidential Election among students in Palembang (Y), this section will present a description and explanation of these five variables based on respondents' feedback on the research questionnaire. The responses from 77 respondents, who are students in Palembang, regarding the research questionnaire will be outlined in the form of a frequency tabulation table with scores for each dimension. Based on the scores and percentages achieved for each dimension/variable, the categorization will be determined based on the following criteria: The maximum score for each questionnaire is 4, or 100%, while the minimum score is 1, or 25% of the maximum score. The distance between adjacent scores is one-fourth of the difference between the maximum and minimum values, which is equal to 19% of the maximum value of 100%. The percentage score intervals for each category are as follows:

- a. 82% to 100% is categorized as very high

- b. 63% to 81.99% is categorized as high
- c. 44% to 62.99% is categorized as moderately high
- d. 25% to 43.99% is categorized as very low

Table 1. Distribution of Respondent Responses for the Functional Prosuming Dimension Production Indicator

Score (S)	Statement Number						Total	%
	17		18		Σ f	Σ f x S		
	f	%	f	%				
1	3	3.90	1.00	1.30	4.00	4.00	0.80	
2	5	6.49	1.00	1.30	6.00	12.00	2.41	
3	46	59.74	48.00	62.34	94.00	282.00	56.63	
4	23	29.87	27.00	35.06	50.00	200.00	40.16	
Total	77	100.00	77.00	100.00	154.00	498.00	100.00	

From the Table 1, it can be seen that the actual score (total score obtained) from the respondents' responses is 498, while the highest possible score (ideal score) is $2 \times 4 \times 77 = 616$. The percentage of the actual score compared to the ideal score is calculated to be 80.8%. This indicates that the percentage score obtained from the responses of the 77 respondents falls within the high criteria. This result shows that Media Literacy with the Functional Prosuming Dimension among students, based on the Production indicator, is categorized as high. Based on the data presented in the table above, the following can be explained. In measuring the question, "Before sharing a video on social media, you always edit it first to ensure that the video created is in accordance with the source of the information" (questionnaire item No. 17), the highest intensity of respondents' responses was found in the agree option, with 46 respondents (59.7%) agreeing, 23 respondents (29.9%) strongly agreeing, 5 respondents (6.5%) disagreeing, and 3 respondents (3.9%) strongly disagreeing with the statement. Next, in measuring the question, "You can create videos for social media by adding text, images, and sound to make them more attractive and to convey the message effectively" (questionnaire item No. 18), the highest intensity of respondents' responses was also found in the agree option, with 48 respondents (62.3%) agreeing, 27 respondents (35.1%) strongly agreeing, 1 respondent (1.3%) disagreeing, and 1 respondent (1.3%) strongly disagreeing with the statement.

Table 2. Total Score Results Percentage/Criteria for the Critical Prosuming Dimension

No.	Indicator	Percentage	Criteria
1.	Creation	77.7%	High
2.	Participation	77.6%	High

Based on the calculations on Table 2, it can be seen that the highest respondent score is found in the indicator of Creation at 77.7%, followed closely by Participation at 77.6%. From these scores, it can be concluded that Media Literacy with the Critical Prosuming Dimension dominating among students is represented by the Creation indicator. This result indicates that students, upon receiving information on social media that does not align with the truth, tend to criticize those who spread such information. Additionally, they actively engage in online communities on social media platforms like Facebook, Instagram, and WhatsApp to socialize and build relationships, as well as participate in creating social connections through the internet (such as participating in forming social media group accounts), indicating a high level of engagement. Similarly, the Participation indicator shows a high score of 77.6%. This score suggests that students, when assessed by their activities of joining online communities such as forming groups on Facebook, Instagram, or WhatsApp, to expand their social networks, are consistently active in interacting with these online communities for the exchange of ideas, further reflecting a high level of engagement.

Table 3. Value of Regression Coefficients and Test Results

Parameter	Regression Coefficient		Path Coefficient	t-Test	Sig.
	B	Std. Error	Beta		
(Constant)	1.760	2.481		0.709	0.000
Function Consuming	0.113	0.145	0.980	0.780	0.000
Critical Consuming	0.212	0.143	0.185	1.479	0.000
Functional Prosuming	0.252	0.152	0.203	1.655	0.000
Critical Prosuming	0.330	0.149	0.285	2.215	0.030

Based on the Table 3, the regression coefficient values obtained are Function Consuming at 0.113, Critical Consuming at 0.212, Functional Prosuming at 0.252, and Critical Prosuming at 0.330, with a constant value of 1.760. Thus, the regression model is as follows:

$$Y = 1.760 + 0.113 X_1 + 0.212 X_2 + 0.252 X_3 + 0.330 X_4 + e$$

This model can be interpreted to mean that Function Consuming has a positive effect on the “*Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students*”. In other words, it can also be stated that the higher the Function Consuming, the better the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students will be. The test results for the regression coefficient show a t-value of 0.113 with a p-value of 0.000. Since the p-value is less than 0.05, the null hypothesis (Ho) is rejected, indicating that with a confidence level of 95%, it can be stated that Function Consuming has a significant effect on the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students. This means that the higher the Function Consuming, the better the Prevention of “*Hoax News*” Spread Leading to the 2024 Presidential Election Among Students will be. Furthermore, it can also be interpreted that Critical Consuming has a positive effect on the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students. In other words, it can also be stated that the higher the Critical Consuming, the better the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students will be. The test results for the regression coefficient show a t-value of 0.212 with a p-value of 0.000. Since the p-value is less than 0.05, the null hypothesis (Ho) is rejected, indicating that with a confidence level of 95%, it can be stated that Critical Consuming has a significant effect on the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students.

This results means that the higher the Critical Consuming, the better the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students will be. Furthermore, it can be interpreted that Functional Prosuming has a positive effect on the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students. In other words, it can also be stated that the higher the Functional Prosuming, the better the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students will be. The test results for the regression coefficient show a t-value of 0.252 with a p-value of 0.000. Since the p-value is less than 0.05, the null hypothesis (Ho) is rejected, indicating that with a confidence level of 95%, it can be stated that Functional Prosuming has a significant effect on the Prevention of “*Hoax News*” Spread Leading to the 2024 Presidential Election Among Students. This means that the higher the Functional Prosuming, the better the Prevention of Hoax News Spread Leading to the 2024 Presidential Election Among Students will be. Regression Coefficient The use of social media can be important for a student depending on how they utilize it.

Social media can help build professional networks, promote a personal brand, and serve as a source of information. However, they must also be aware of the risks associated with social media use and learn to use these platforms wisely. To ensure the accuracy of news regarding the 2024 Presidential Election before sharing it on social media, there are several steps that can be taken: Check the news source: Make sure the news source is credible and accountable. Try to find out if the news source has a good reputation and is affiliated with recognized media. Verify facts: Double-check the information provided by looking for other sources that can confirm the truth of the news. Check the publication date: Verify the publication date of the news. Many fake news articles spread on social media with misleading or incorrect dates. Review the content of the news: Read the news content carefully to see if there is any inconsistent or suspicious information. Don't rush to share: Avoid rushing to share the news on social media before confirming its accuracy. By following these steps, one can help ensure that the information received about the 2024 Presidential Election is accurate and trustworthy. There are several ways to critique misleading or harmful news about the 2024 Presidential Election on social media: Provide clear arguments: When critiquing false or harmful news, ensure that you provide clear and measurable arguments. Avoid criticizing without giving clear reasons or just based on emotions. Include facts and evidence: Present facts and evidence to support your arguments. This will make your criticism more convincing and provide clearer understanding for your readers or followers. Use respectful language: Avoid using harsh or derogatory language when critiquing news. Use polite language that respects others. Offer alternative information sources: If you find misleading news, suggest reliable and trustworthy alternative sources of information. Provide solutions: Offer constructive solutions as alternatives to help the public obtain accurate and good information regarding the 2024 Presidential Election. Avoid spreading false news: Do not disseminate unverified or false news. Instead, help improve the situation by providing constructive criticism and educating others on how to obtain accurate information.

4. Discussion and Conclusions

By implementing these VSAS strategies, one can help improve the quality of information circulating on social media related to the 2024 Presidential Election and assist the public in acquiring accurate information. It is essential for individuals, especially students, to master media literacy in efforts to prevent the spread of hoax news leading up to the 2024 Presidential Election. This is due to the fact that the spread of hoax news can have negative impacts on society and the democratic process. In this digital age, information and news spread very quickly through social media and other digital platforms. Therefore, individuals, particularly students, need to be able to sift through and evaluate the information received before sharing it with others. By mastering media literacy, individuals, especially students, can recognize the characteristics of hoax news and distinguish news that has high credibility and truthfulness. Furthermore, someone with media literacy skills will also have the ability to evaluate information sources and access factual news. In the context of the 2024 Presidential Election, efforts to prevent the spread of hoax news are crucial. The spread of hoax news can influence public opinion and the democratic process. Thus, by mastering media literacy, individuals, especially students, can help prevent the spread of hoax news and ensure that the democratic process runs smoothly.

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