

## Development of Telecounseling Media Based on Facial Expression Analysis as a Tool for Detecting Suicide Tendencies in Students

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### Abstrak

Penelitian ini dilatarbelakangi oleh meningkatnya angka kasus bunuh diri pada mahasiswa di Kota Malang sebesar 20%. bertujuan mengembangkan media telekonseling berbasis Facial Expression Analysis (FEA) dalam mendeteksi kecenderungan bunuh diri. Menggunakan metode pengembangan Research and Development (R&D) yang diadaptasi dari model ADDIE yang dimodifikasi menjadi 4 tahapan yang di empat tahap, yaitu analisis, desain, pengembangan, dan evaluasi. Analisis kebutuhan menunjukkan bahwa baik konselor maupun konseli memerlukan fitur seperti pengaturan jadwal, laporan FEA, bibliokonseling, dan forum. Hasil validasi dari para ahli menunjukkan media ini sangat relevan, mudah digunakan, dan menarik, dengan indeks validitas 1. Evaluasi akhir menunjukkan bahwa media ini dapat meningkatkan kerja konselor dan membantu konseli dalam mengatasi masalah emosional mereka. Fitur-fitur yang dirancang dapat mendukung proses konseling yang lebih komprehensif dan mendalam.

Kata Kunci: Bunuh Diri, Website Telekonseling, Analisis Ekspresi Wajah

### Abstract

This research is motivated by a 20% increase in suicide cases among college students in Malang City. It aims to develop a telecounseling platform based on Facial Expression Analysis (FEA) to detect suicidal tendencies. The development follows a Research and Development (R&D) methodology, adapted from the ADDIE model and modified into four stages: analysis, design, development, and evaluation. Needs analysis shows that both counselors and clients require features such as scheduling, FEA reports, bibliocounseling, and forums. Expert validation results indicate that this platform is highly relevant, user-friendly, and engaging, with a validity index of 1. The final evaluation shows that the platform can enhance counselors' effectiveness and assist clients in managing their emotional issues. The designed features support a more comprehensive and in-depth counseling process.

Keywords: Suicide, Telecounseling Website, Facial Expression Analysis

## INTRODUCTION

Mental health disorders are common in adolescents. In Indonesia, 6.1% of the population aged 15 years and over experience mental health problems (Ministry of Health, 2023). Indonesian adolescents often experience anxiety 26.7%, ADHD 10.6%, depression 5.3%, behavioral problems 2.4%, and post-traumatic stress 1.8% (Yonatan, 2023). Adolescents who experience anxiety and depression are five times more likely to have suicidal thoughts (Windarwati et al., 2022). Data from the National Police Pusiknas shows that in 2022, there were 1,287 cases of suicide in Indonesia, with 108 cases or 8.39% occurring in students. In January-October 2023, the East Java Regional Police recorded 971 cases of suicide with 8.45% of them involving students. In 2022, Malang City recorded 15 cases of student suicide, while in 2023, it recorded 18 cases of student suicide, showing an increase of 20%.

The phenomenon of suicide among college students shows that mental health treatment is not optimal (Kaligis et al., 2021). Ironically, many victims have received or are receiving mental health treatment from professionals (Iorfino et al., 2021). Malang City, known as an educational city, has become a new cluster for psychological disorders that can lead to suicide (Sobieski et al., 2024). Research by Primananda and Keliat (2019) found that suicidal ideation is the climax of various psychological problems that are difficult for counselors to identify, even in counseling sessions. This is due to limitations in the screening process carried out simultaneously with the provision of intervention treatment, so that counselors lack data for in-depth analysis.

Theoretically, suicidal tendencies can be analyzed through three main aspects: behavioral, verbal, and non-verbal (Large et al., 2020). The behavioral aspect involves observing a person's actions, while the verbal aspect includes direct or indirect statements regarding the desire to die or feelings of hopelessness (Cyzy et al., 2018). The non-verbal aspect focuses on physical signs and facial expressions that indicate emotional conditions that are not directly expressed (Scherer et al., 2021). Of these three aspects, non-verbal analysis has the advantage of being able to reveal hidden signals that are often undetectable through direct words or actions (Simcock et al., 2020).

Research by Liu et al (2022) showed that non-verbal approaches allow early and more accurate identification of individuals at high risk of suicide. Tadalagi and Joshi (2021) found that facial expressions indicating suicidal thoughts can be grouped into several parts. Using facial photography technology, this study analyzed still portrait images. However, there are limitations in the use of still images because it does not allow observation of the condition of the expression before and after. This study aims to develop media that can be used to photograph facial expressions with more comprehensive data on suicidal thoughts, using telecounseling that allows more privacy and comfort for clients, and moving video analysis that allows observation of facial expressions in a broader context, improving the quality of Facial Expression Analysis (FEA) findings.

Association for Educational, Communications and Technology (AECT) has updated the definition of Educational Technology in 2023, which now has a broader scope. In the context of developing FEA-based telecounseling media for detecting suicidal tendencies in students, the application of educational technology must integrate ethical principles, research, and practice to enrich knowledge and improve the effectiveness of learning and performance (Heggart et al., 2023). Knowledge of facial expressions associated with certain emotional symptoms is essential to identify students at risk of experiencing severe stress or depression, which can trigger suicidal tendencies (Calvo & D'Mello, 2010). Therefore, this technology

needs to be carefully designed to ensure that data collected through facial expression analysis is used ethically and responsibly, and supports student empowerment to get the right support.

In terms of Content Knowledge, the development of this system requires a deep understanding of the emotional psychology of students and how facial expressions can depict their emotional state (Scherer, Siddiq, & Tondeur, 2019). In addition, the algorithm used to analyze facial expressions must be based on solid research on emotional indicators and their relationship to psychological conditions that can affect student well-being. This system must be able to accurately detect changes in expression that indicate early signs of suicidal tendencies, such as decreased expression or emotional helplessness (Cacciatori et al., 2022).

From the perspective of Pedagogical Knowledge, this telecounseling media functions as a tool to strengthen the role of counselors in detecting mental health problems in students more quickly and effectively. Continuous implementation and evaluation of this tool is important to ensure that the interventions carried out are right on target and can help students overcome their emotional difficulties with adequate support (Januszewski and Molenda, 2008). By considering the right ethical and technological aspects, this tool can be part of a broader teaching strategy to create a learning environment that supports students' mental health.

The taxonomy of learning discusses three main variables, namely conditions, strategies, and outcomes. In the context of this study, the main focus is on the condition and strategy variables. The condition variables are related to the characteristics of students, in this case students in Malang City who have a tendency to commit suicide. Based on existing data, around 20% of students in Malang City experienced suicidal tendencies from 2022 to 2023, which indicates serious problems related to mental health among students.

In the strategy variable, the classification applied is a delivery strategy related to the media. In order to overcome this mental health problem, one of the proposed approaches is the development of telecounseling media based on Facial Expression Analysis (FEA). This approach aims to detect changes in facial expressions that can indicate symptoms of suicidal tendencies, thus allowing early intervention by counselors or medical personnel. By using this technology, it is hoped that the level of suicidal tendencies in students in Malang City can be reduced, through the delivery of more appropriate and data-based support (Zhu & Lei, 2020).

## **METHOD**

This study uses a development method or Research and Development (R&D) using the ADDIE development model by Dick and Carrey in 1996. The ADDIE development model consisting of 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation was then modified into 4 stages, namely Analysis, Design, Development, and Evaluation. The modified ADDIE development model was carried out to adjust the formulation of the problem and the objectives of the research to be achieved, so that this research model only uses 4 stages. The following is a detailed description of the development stages in this research.

1. Analysis Stage: at this stage, an analysis of media needs is carried out which is intended for clients and counselors. From the results of the needs analysis, data processing is then carried out for the needs at the design stage.
2. Design Stage: at this stage, the website and its features are designed based on the results of the needs analysis that has been carried out.
3. Development Stage: at this stage, website development and website integration with FEA are carried out. Media and material validation are carried out by experts.

4. Evaluation Stage: at this stage, evaluations are carried out at each stage and a final evaluation.

## RESULT AND DISCUSSION

### Analysis Stage

At this stage, an analysis of media needs for counselors with a total of 10 respondents and an analysis of media needs for clients with a total of 104 respondents have been conducted. The following is a table of the results of the media needs analysis.

Table 1. Results of Media Needs Analysis for Counselors

QUESTION	YES	NO
Do you feel the need for access to a forum page to discuss with fellow counselors is important to you?	10	0
Do you find increased communication and collaboration through forum pages beneficial?	8	2
Do you feel that the ease of arranging a counseling schedule via the counseling schedule page is important to you?	10	0
Do you feel that the counseling schedule page feature can increase efficiency in managing your counseling time?	9	1
Do you feel the need for an FEA page report to obtain a facial expression analysis report is important to you?	7	3
Do you think the reports generated by the FEA page report are helpful in detecting your clients' suicidal tendencies?	10	0

Table 2. Results of Media Needs Analysis for Counselees

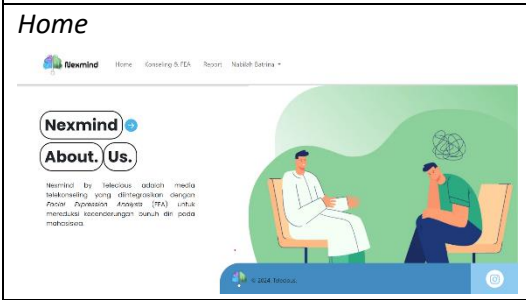
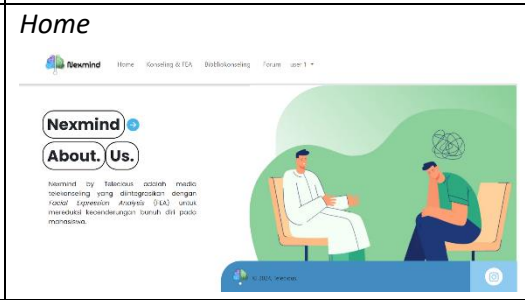
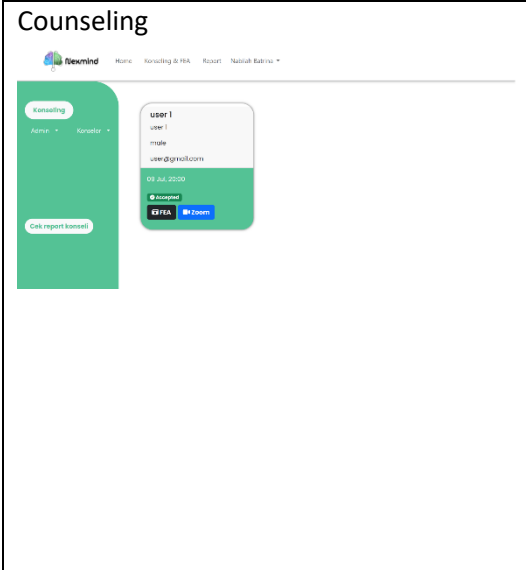
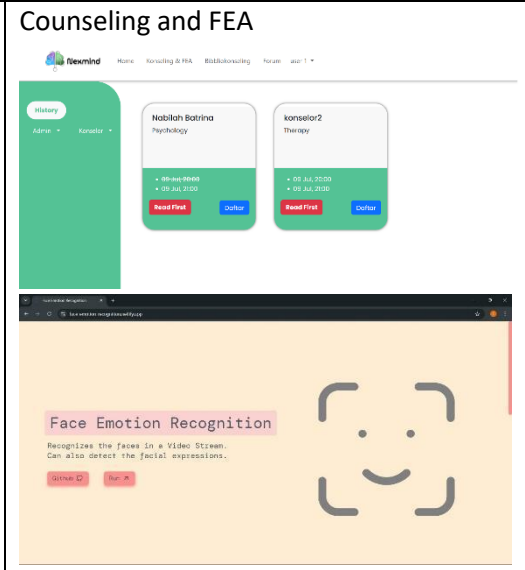


QUESTION	YES	NO
Have you ever felt the need to seek professional help for emotional problems or stress you are experiencing?	94	10
Have you ever felt that your personal or emotional problems significantly affected your ability to carry out daily activities?	90	14
Do you feel that having access to learning materials about mental health would help you cope with everyday stress and anxiety?	95	9
Do you often search for articles or materials to get information on how to manage emotions and mental health?	92	12
Have you ever felt the need to discuss with others who have had similar experiences regarding the mental health issues you are facing?	90	14
Would you be interested in joining an online forum where you can share experiences and get support from others?	87	17
Have you ever felt the need for professional counseling for personal or emotional problems you are experiencing?	92	12
Do you feel comfortable conducting counseling sessions online rather than in person?	95	9
Have you ever had difficulty expressing your emotions verbally when talking to a counselor?	94	10
Do you believe that facial expression analysis can help counselors better understand your feelings during counseling sessions?	94	10

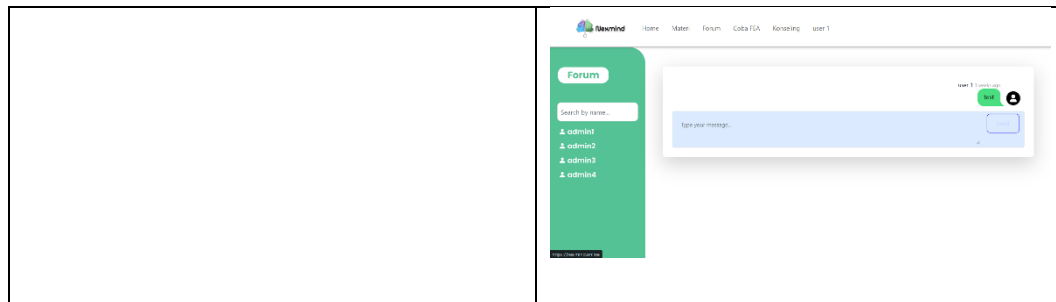
The results of the analysis show several features needed by counselors and clients. The features needed for counselors consist of home features, counseling features, and FEA report features. The features needed for clients consist of home features, counseling and FEA features, bibliocounseling features, and forum features.

### Design Stage

At this stage, the website design and its features have been created from the results of the needs analysis that has been carried out. The following are the results of the website design.

Table 3. Website Design Results

COUNSELOR	COUNSELING
<p><b>Home</b></p> 	<p><b>Home</b></p> 
<p><b>Counseling</b></p> 	<p><b>Counseling and FEA</b></p> 
<p><b>Report FEA</b></p> 	<p><b>Bibliocounseling</b></p> 
	<p><b>Forum</b></p>



### Development Stage

At this stage, FEA has been developed and integrated with the website. The flow of website development and FEA integration is as follows:

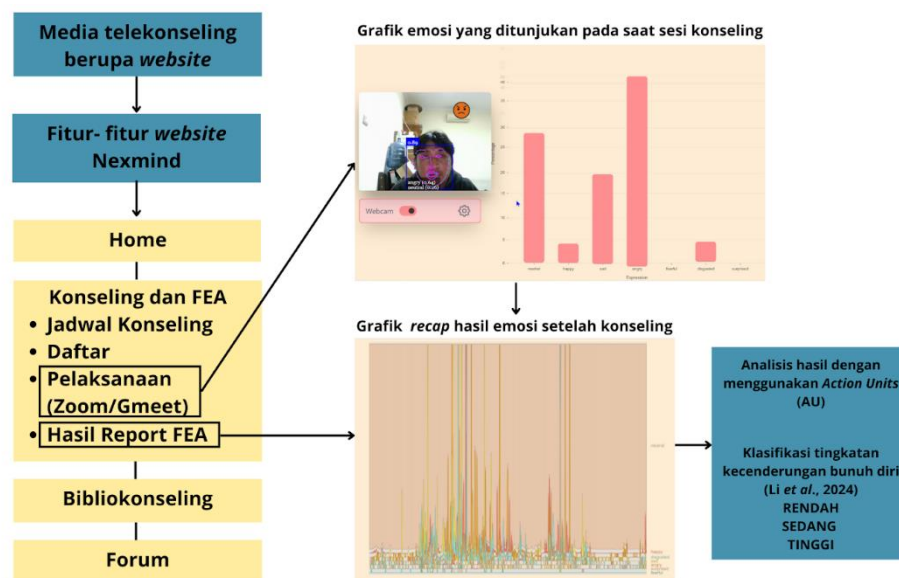


Figure 1. Website Development Flow and FEA Integration

The image above is the result of website development and integration with FEA. During the counseling session, FEA will start working by providing graphs related to emotional indicators, such as neutral, happy, sad, angry, happy, disgusted, and surprised. After the counseling session is complete, there will be a recap graph of the results of the emotional indicators that appear. Then the recap graph of the emotional results is analyzed using Action Units (AU), then the AU is classified into levels of suicidal tendencies that can.

In the development stage, media and material validation has been carried out. The following are the results of the calculation of the agreement of media and material experts.

Table 4. Media Expert Agreement Calculation

		Expert Opinion 1	
		Low Relevance(1-2)	High Relevance(3-4)
Expert Opinion 2	Low Relevance (1-2)	A = 0	B = 0
	High Relevance (3-4)	C = 0	D = 25

Table 5. Media Expert Agreement Calculation

		Expert Opinion 1	
		Low Relevance(1-2)	High Relevance(3-4)
Expert Opinion 2	Low Relevance (1-2)	A = 0	B = 0
	High Relevance (3-4)	C = 0	D = 25

**Calculation Results:**

- Calculation Formula:  $D/A+B+C+D=$  Index
- Media Expert :  $25/0+0+0+25= 1$
- Subject Matter Expert :  $25/0+0+0+25= 1$
- Classification of Media and Material Validity: Very appropriate, very useful, very easy and very interesting

From the results of the calculation of the agreement between media and material experts, an index of 1 was obtained. Based on the validity questionnaire criteria, it shows that the assessment is in the very high category, namely very appropriate, very useful, very easy and very interesting.

**Evaluation Stage**

The evaluation stage of the development of telecounseling media based on facial expression analysis (FEA) showed quite positive results based on input from counselors and clients. Based on the needs analysis, features such as forum pages, counseling schedule settings, and Facial Expression Analysis (FEA) reports were considered important by counselors, with the majority of them agreeing that these features could help them improve the efficiency and effectiveness of counseling. Likewise, the majority of clients felt that features such as bibliocounseling, forums, and facial expression analysis would be very helpful for them in overcoming emotional and mental health problems. This indicates that the development of these features is right on target. In addition, the validation of media and materials carried out at the development stage showed a very high level of expert agreement with a validity index of 1, which means that the media and materials were considered very relevant, easy to use, and interesting.

**CONCLUSION**

The results of the needs analysis of the development of telecounseling media based on Facial Expression Analysis (FEA) show that both counselors and clients really need features that facilitate the counseling process. Counselors feel that features such as counseling schedule settings and FEA reports are very important to improve communication and work efficiency. Most clients also stated that access to bibliocounseling, forums, and facial expression analysis really helped them in overcoming emotional problems and improving the counselor's understanding of their condition during counseling sessions.

The design stage that integrated the results of the needs analysis succeeded in producing a website design that was suitable for counselors and clients, while the development stage involved integrating FEA directly with the website. Validation of media and materials at the development stage showed very positive results, with a validity index of 1 from experts, indicating that this media is very relevant, easy to use, and interesting. This evaluation shows

that the development of this telecounseling media is not only in accordance with user needs, but is also effective in supporting a more efficient and in-depth counseling process.

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