



## Effectiveness of Website-Based Counseling Application Using Forward Chaining to Improve Counselors' Decision-Making Ability

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**Abstract:** This research is motivated by the importance of the ability of Guidance and Counseling (BK) teachers to make appropriate, systematic, and data-based service decisions in schools. In practice, decision-making for BK services still often depends on subjective experience, so supporting media are needed that can help BK teachers in analyzing problems and determining alternative services. This study aims to determine the effectiveness of the use of website-based counseling applications with the forward chaining method in improving the decision-making ability of BK teachers in Dumai City schools. This study uses a quantitative approach with quasi-experimental methods and one-group pretest-posttest design. The research sample consisted of 50 BK teachers in Dumai City schools. The instrument used was a questionnaire on the decision-making ability of BK teachers given before and after the use of the application. Data were analyzed using descriptive statistics, paired sample t-test, and N-Gain. The results showed that the average pretest score of 43.84 increased to 83.26 in the posttest, with an average increase of 39.42. The results of the paired sample t-test showed a significant difference between the pretest and the posttest, which was obtained from the results using the SPSS Application, namely  $t$  calculation = 59.98 and  $p$ -value  $0.001 < 0.05$ . The average N-Gain value of 0.704 or 70.39% is in the high category. Thus, a website-based counseling application with the forward chaining method is effectively used to improve the decision-making ability of BK teachers in schools.

**Abstrak:** Penelitian ini dilatarbelakangi oleh pentingnya kemampuan guru Bimbingan dan Konseling (BK) dalam mengambil keputusan layanan yang tepat, sistematis, dan berbasis data di sekolah. Dalam praktiknya, pengambilan keputusan untuk layanan BK masih sering bergantung pada pengalaman subjektif, sehingga diperlukan media pendukung yang dapat membantu guru BK dalam menganalisis masalah dan menentukan alternatif layanan. Penelitian ini bertujuan untuk mengetahui efektivitas penggunaan aplikasi konseling berbasis website dengan metode forward chaining dalam meningkatkan kemampuan pengambilan keputusan guru BK di sekolah-sekolah Kota Dumai. Penelitian ini menggunakan pendekatan kuantitatif

*dengan metode kuasi-eksperimental dan desain pretest-posttest satu kelompok. Sampel penelitian terdiri dari 50 guru BK di sekolah-sekolah Kota Dumai. Instrumen yang digunakan adalah kuesioner kemampuan pengambilan keputusan guru BK yang diberikan sebelum dan sesudah penggunaan aplikasi. Data dianalisis menggunakan statistik deskriptif, uji-t sampel berpasangan, dan N-Gain. Hasil menunjukkan bahwa skor rata-rata pretest sebesar 43,84 meningkat menjadi 83,26 pada posttest, dengan kenaikan rata-rata sebesar 39,42. Hasil uji t sampel berpasangan menunjukkan adanya perbedaan yang signifikan antara pretest dan posttest, yang diperoleh dari hasil menggunakan Aplikasi SPSS, yaitu nilai  $t = 59,98$  dan nilai  $p 0,001 < 0,05$ . Nilai rata-rata N-Gain sebesar 0,704 atau 70,39% termasuk dalam kategori tinggi. Dengan demikian, aplikasi konseling berbasis website dengan metode forward chaining efektif digunakan untuk meningkatkan kemampuan pengambilan keputusan guru BK di sekolah*

**Keywords :** website-based counseling application, forward chaining, decision making, guidance and counseling teachers, schools

## INTRODUCTION

Guidance and Counseling Services (BK) in schools are an important part of the education system because they play a role in helping students overcome personal, social, academic, and career problems. In its implementation, Guidance and Counseling (BK) teachers are not only tasked with providing information services, consultation, individual counseling, group counseling, or classical guidance, but must also be able to make professional decisions based on the real conditions of students. The decision made by BK teachers will determine the type of service, priority handling, follow-up, and possible referrals given to students. Therefore, decision-making ability is one of the important competencies in supporting the quality of BK services in schools.

The decision-making ability of BK teachers can be interpreted as professional abilities in identifying student problems, collecting relevant data, analyzing problem indicators, considering service alternatives, choosing the most appropriate service, and evaluating decision follow-up responsibly. Decision-making in BK services cannot be done arbitrarily because each student's case has different characteristics, backgrounds, and levels of urgency. BK teachers must be able to distinguish whether a case requires

information services, group guidance, individual counseling, group counseling, consultation with parents, collaboration with homeroom teachers, or referrals to more authorities. Thus, BK teachers' decision-making is a systematic thinking process that involves cognitive, analytical, ethical, and practical aspects.

In practice in schools, the decision-making process of BK teachers often faces various obstacles. BK teachers have to deal with a large number of students, a variety of complex problems, time constraints, and limitations of systematically documented data. Shi and Brown (2020) Demonstrated that the case load and time use of school counselors are related to the effectiveness of the school's services and achievements. This condition indicates that BK teachers need system support that can help the case analysis process more efficiently and in a more directed manner. Without a support system, risky service decisions rely more on subjective experience, intuition, or practical habits, which can reduce the objectivity and consistency of the service.

Studies of teacher decision-making also show that professional decisions are often not entirely data-driven. Vanlommel, Van Gasse, Vanhoof, then Van Petegem (2017) It found that teachers' decisions are still heavily influenced by intuition and experience, while

the use of systematically collected data is not always optimal. In the context of BK services, this is important because the decision of BK teachers concerns the development needs of students. Decisions that are too dominant based on intuition can cause services to be less on target, while data-driven decisions can help BK teachers understand the problem more objectively. Therefore, BK services need a technology-based support model that can help BK teachers organize data, trace problem indicators, and determine service alternatives more systematically.

Theoretically, the decision-making of BK teachers can be explained through problem-solving theory, rational decision-making theory, and the Cognitive Information Processing approach. Heppner and Krauskopf (1987) Explains that problem solving involves the process of receiving information, processing information into a solution plan, and executing the plan. In BK services, BK teachers need to understand students' problems, interpret facts, choose service strategies, and determine appropriate follow-ups. Simon (1977) Through rational decision-making theory, it emphasizes that good decisions are made through the stages of problem identification, information search, alternative development, selection of the best alternatives, and decision evaluation. Meanwhile, Sampson, Lenz, Reardon, and Peterson (1999) through the Cognitive Information Processing approach, it is explained that problem-solving and decision-making are influenced by the individual's ability to obtain, organize, process, and use information. These three theoretical bases show that BK teachers' decision-making needs to be done through a systematic, data-based flow, and supported by a structured thought process.

The development of digital technology provides a great opportunity to strengthen BK services in schools. Digital technology in education not only functions as an information medium, but can also be used to support data management, communication, collaboration, evaluation, and decision-

making (Haleem et al., 2022). In BK services, technology can help BK teachers store student data, provide service media, facilitate access to information, and support the assessment and service follow-up process. Sabella, Poynton, and Isaacs (2010) emphasized that technological competence is an important aspect for school counselors, especially in data management, ethics, and the use of technology to support service practices. In Indonesia, Suryawati, Susilo, Wijayanti, Asrowi, and Surur (2025) also shows that attitudes towards technology, interests, competence, and the use of technology have an effect on the use of digital media in BK services. Thus, the integration of technology in BK is an important need to answer the challenges of educational services in the digital era.

Although the use of technology in BK services continues to grow, most previous research has still focused on information media, online counseling, career services, or the use of technology as a means of communication and administration. Molds, Vogel, then Rochlen (2005) Explains that online counseling has the potential to expand access to services, but it also requires attention to ethics, training, technology, and user competence. Sarasvati and Rukiyati (2024) emphasized that technology can support BK service practices, especially in the management and delivery of services. Khadijah, Widodo, and Sulistyowati (2023) It also shows that the website-based problem solving counseling model can be used to support students' mental health. However, these studies have not specifically placed websites as a rule-based decision support system designed to improve the decision-making skills of BK teachers in schools.

One of the relevant technological approaches to support BK teachers' decision-making is the forward chaining method. Forward chaining is a method of forward reasoning in a rule-based expert system. This method works from the initial facts to a conclusion or recommendation. In a rule-based system, knowledge is structured in the form of "if-then rules." The data that users

enter will be matched to the rules available in the knowledge base. If the data meets certain conditions, the system will run the rules and generate new conclusions. This process takes place gradually until the system obtains a final recommendation. Anwar (2021) Explains that forward chaining can be used in an education expert system to trace the initial data and make decisions based on the rules that have been designed.

In the context of BK services, the forward chaining method can be used to help BK teachers trace the symptoms or indicators of student problems. The initial facts that are put into the system can be in the form of student behavior, academic conditions, social problems, emotional barriers, discipline, learning motivation, or the results of initial assessments. Furthermore, the system matches these facts with the available BK service rules. For example, if students show certain indicators related to low motivation to learn, absenteeism, and decreased achievement, then the system can direct BK teachers to possible academic problems and recommend relevant services. These recommendations do not replace the role of BK teachers, but become a matter of professional consideration in determining services that suit the needs of students.

A website-based counseling application with the forward chaining method can be positioned as a decision support system for BK teachers. Poszler and Lange( 2024) explains that intelligent decision-support systems can help humans in making decisions by strengthening the deliberation process, providing recommendations, and supporting actions. In this study, a website-based application helped BK teachers through two main mechanisms. First, the application provides a gradual problem identification flow so that BK teachers can enter and organize facts more systematically. Second, the forward chaining method processes that data through specific rules to generate service recommendations. Thus, the workflow of the application can be described

as follows: the data of the student's problem is entered into the system, the system matches the data with forward chaining-based rules, the system generates service recommendations, the BK teacher examines the recommendations, then the BK teacher makes a service decision based on the data and professional considerations.

The gap in this research lies in the limited number of studies that specifically test the effectiveness of website-based counseling applications with the forward chaining method in improving the decision-making ability of BK teachers. Previous research generally emphasizes the use of BK technology in terms of service access, communication, information media, digital readiness, or practicality of use. Meanwhile, research that positions websites as a rule-based decision support system in school BK services still needs to be strengthened. In addition, the context of research in Dumai City schools provides an empirical space to see whether the applications that have been developed really have an impact on the ability of BK teachers to make service decisions in a more systematic, objective, and data-based manner.

The novelty of this research lies in the integration between website-based counseling applications, forward chaining methods, and the decision-making ability of BK teachers. This study not only assesses the use of websites as digital media, but places them as a decision support system that contains a rule base and reasoning flow. Thus, the contribution of this research is not only in the technological aspect of BK services, but also in strengthening the professional thinking process of BK teachers in making service decisions. Theoretically, this study expands the study of the relationship between problem solving, decision-making, information processing, and decision support systems in BK services. Practically, this study can provide an alternative media for BK teachers to analyze student cases, determine appropriate services, reduce subjective bias, and improve the efficiency of BK services in schools.

Based on this description, this study is directed to answer the question: is the use of a website-based counseling application with the forward chaining method effective in improving the decision-making ability of Guidance and Counseling teachers in Dumai City schools? This question is important because the effectiveness of an app is not enough to be proven through the validity and practicality of the product, but it also needs to be tested through the improvement of the user's capabilities after using the app. Therefore, this study uses a pretest-posttest design to compare the decision-making skills of BK teachers before and after the use of the application.

The research hypothesis proposed is as follows:  $H_0$ : there is no significant difference in the decision-making ability of BK teachers before and after using a website-based counseling application with the forward chaining method.  $H_1$ : there is a significant difference in the decision-making ability of BK teachers before and after using a website-based counseling application with the forward chaining method. Thus, this study is expected to provide empirical evidence that a website-based counseling application with the forward chaining method is effectively used as a supporting medium in improving the decision-making ability of BK teachers in Dumai City schools.

## **METHOD**

This research uses a quantitative approach with a quasi-experimental method. The research design used is a one-group pretest-posttest design, which is a research design that involves one group of subjects who are given initial measurements before treatment and final measurements after treatment. This design was used to determine the effectiveness of the use of a website-based counseling application with the forward chaining method in improving the decision-making ability of Guidance and Counseling (BK) teachers in Dumai City schools. The one-group pretest-posttest design is suitable to test changes in subjects'

abilities before and after being given certain interventions in the same group (Creswell & Creswell, 2018; Campbell & Stanley, 1963).

In simple terms, the design of this research can be described as follows:

$$O_1 — X — O_2$$

Description:

$O_1$  = pretest of BK teacher's decision-making ability before using the application

$X$  = treatment in the form of the use of a website-based counseling application with the forward chaining method

$O_2$  = posttest of BK teacher's decision-making ability after using the application

This research is a continuation of development research that previously produced a product in the form of a website-based counseling application with the forward chaining method. However, the focus of this research is no longer on the product development process, but on testing the effectiveness of using the application. Thus, a website-based counseling application with the forward chaining method is positioned as a treatment, while the decision-making ability of BK teachers is positioned as a bound variable.

This research was carried out in Dumai City, Riau Province. The implementation activity of using a website-based counseling application with the forward chaining method was carried out on September 10-11, 2025 at SMK Negeri 2 Dumai in collaboration with ABKIN Dumai Partners. The selection of this location is based on the involvement of Guidance and Counseling (BK) teachers in Dumai City schools as application users and the relevance of the activity to the needs of improving the decision-making ability of BK teachers in guidance and counseling services in schools.

The subject of this study is a Guidance and Counseling teacher who works in Dumai City schools. The research sample amounted to 50 BK teachers who were selected using the purposive sampling technique. This technique is used because the researcher sets certain criteria in accordance with the research objectives, namely BK teachers who are active in providing guidance and

counseling services in schools and are willing to participate in the entire series of research activities. Purposive sampling is suitable for use when the researcher needs respondents who have certain characteristics and are relevant to the focus of the research (Eric, 2016). The sample criteria in this study include: (1) status as a Guidance and Counseling teacher in school; (2) actively provide BK services to students; (3) have experience in handling student problems; and (4) willing to participate in pretest activities, application use, and posttest.

The instrument used in this study is a questionnaire on the decision-making ability of BK teachers. This questionnaire is used to measure the ability of BK teachers to make service decisions based on the process of problem identification, data collection, analysis of problem indicators, consideration of alternative services, selection of service decisions, and follow-up evaluation. The instrument was arranged in the form of a Likert scale with five response options, namely strongly disagree, disagree, hesitate, agree, and strongly agree. Scores are given from 1 to 5. A higher total score indicates a better decision-making ability of BK teachers.

The indicators of BK teachers' decision-making ability in this study include six aspects. First, the ability to identify and formulate student problems. Second, the ability to collect and use relevant data. Third, the ability to analyze indicators of problems and service needs. Fourth, the ability to determine several alternative BK services. Fifth, the ability to choose the right service decision, objective, and in accordance with the needs of students. Sixth, the ability to evaluate and follow up on service decisions. The preparation of these indicators is based on problem-solving theory, rational decision-making theory, and Cognitive Information Processing approach which emphasizes the importance of problem identification, information processing, alternative selection, and decision evaluation (Heppner & Krauskopf, 1987; Sampson et al., 1999; Simon, 1977).

Instrument validation is carried out through expert validation or expert judgment. Expert validation aims to assess the feasibility of an instrument before it is used in data collection. This validation process is important because the instrument must truly represent the construct to be measured, namely the decision-making ability of BK teachers. The validity of the content through expert assessment is one of the procedures that can be used to ensure the conformity between the instrument items, indicators, and constructs measured (Polit & Beck, 2006; Yusoff, 2019).

The instrument validation is carried out by three expert validators. The validator assessment includes two main aspects, namely the content/material aspect and the language aspect. The content/material aspect was used to assess the suitability of the questionnaire items with the indicator of the decision-making ability of BK teachers. Language aspects were used to assess sentence clarity, accuracy of terms, readability, and ease of instrument understanding by respondents. The results of instrument validation are presented in Table 1.

Table 1. Results of Instrument Validation by Experts

Validation Aspects	Validation Percentage	Qualifications
Contents/Materials	80%	Valid and can be used without revision
Language	100%	Valid and can be used without revision
Average	90%	Highly valid and worth using

Based on Table 1, the validation results in the content/material aspect obtained a

percentage of 80%, while the language aspect obtained a percentage of 100%. The average instrument validation result is 90%. These results show that the questionnaire of BK teachers' decision-making ability is in the category of being very valid and feasible to use in the research. Thus, the instrument is declared to meet the feasibility of content and language based on the assessment of experts.

The treatment in this study is in the form of the use of a website-based counseling application with the forward chaining method. This application is designed as a decision support system that helps BK teachers explore the facts of students' problems and obtain service recommendations based on "if-then rules". The forward chaining method works through forward reasoning, which is a search process that starts from the initial facts or data entered by the user, then matched with the rule base to produce conclusions or service recommendations. In the context of this study, the initial facts can be in the form of symptoms of student problems, academic conditions, social behaviors, emotional barriers, discipline, learning motivation, or other information relevant to BK services.

The research procedure is carried out through several stages. The first stage is preparation, namely the researcher prepares applications, questionnaire instruments, website usage guides, and application usage scenarios. The second stage is the implementation of the pretest, where BK teachers fill out a decision-making ability questionnaire before using the application. The third stage is orientation and training on the use of the application which was carried out at implementation activities at SMK Negeri 2 Dumai with ABKIN Dumai Partners on September 10-11, 2025. At this stage, BK teachers are given an explanation of the purpose of the application, the main features, how to access the website, how to enter case data, how to choose problem indicators, and how to read service recommendations generated by the system. The fourth stage is the use of applications,

namely BK teachers use applications to trace BK service cases based on forward chaining flows. At this stage, BK teachers follow the system flow starting from problem identification, data filling, indicator selection, rule processing, to obtaining service recommendations. The fifth stage is the implementation of the posttest, where BK teachers again fill out the decision-making ability questionnaire after using the application. The sixth stage is data processing and analysis.

To maintain consistency of treatment, all respondents received the same explanation, guide, and procedure for using the application. The researcher ensures that BK teachers use the application according to the predetermined flow. This effort is carried out so that the treatment given to all respondents takes place uniformly. Because this study uses a one-group pretest-posttest design, there are several potential threats to internal validity, such as test effects, maturity, history, and instrument changes. To minimize these threats, this study used the same instruments in the pretest and posttest, provided uniform instructions, carried out the treatment in a series of controlled activities, and used the same application usage procedure to all respondents. This control is important because quasi-experimental design needs to pay attention to potential biases that can affect the study's conclusions (Campbell & Stanley, 2011; Shadish et al., 2001).

The research data was analyzed using descriptive and inferential statistics. Descriptive statistics are used to find out the minimum score, maximum score, average, standard deviation, and increase of pretest and posttest scores. This analysis aims to provide an overview of the decision-making ability of BK teachers before and after using the application.

Furthermore, the normality test is carried out on the data on the difference in pretest and posttest scores. The normality test is used to determine the right type of differential test. If the score difference data is distributed normally, then the analysis is

continued using a paired sample t-test. If the data is not normally distributed, then the alternative test used is the Wilcoxon test. The Shapiro-Wilk normality test can be used to find out if the data follows a normal distribution, especially at small to medium sample sizes (Shapiro & Wilk, 1965).

The paired sample t-test was used to find out if there was a significant difference between the pretest and posttest scores of BK teachers' decision-making ability. This test is suitable for use because the data came from the same group and was measured in two different times, namely before and after treatment (Field, 2024). The test was carried out at a significance level of 0.05. If the significance value is less than 0.05, then there is a significant difference between the decision-making ability of BK teachers before and after using the application.

In addition to the difference test, this study also uses N-Gain analysis to determine the level of improvement in BK teachers' decision-making ability. N-Gain is calculated by the formula:

$$N - gain = \frac{(skor\ Posttest - skor\ Pretest)}{(skor\ ideal - skor\ Pretest)}$$

The N-Gain category refers to the Hake criterion (Hake, 1998), which is low if  $g < 0.30$ , medium if  $0.30 \leq g < 0.70$ , and high if  $g \geq 0.70$ . The N-Gain calculation is used because it not only indicates an increase in score, but also describes the magnitude of the increase compared to the maximum chance of improvement that may be achieved.

The effectiveness of using a website-based counseling application with the forward chaining method is determined based on three criteria. First, there was an increase in the average posttest score compared to the pretest. Second, there is a significant difference between pretest and posttest scores based on statistical test results. Third, the N-Gain value indicates a moderate or high improvement category. Thus, the conclusions of effectiveness in this study were not only based on changes in the

average score, but were also reinforced through inferential statistical analysis and ability improvement analysis.

## RESULTS AND DISCUSSION

### Results

This study aims to determine the effectiveness of the use of website-based counseling applications with the forward chaining method in improving the decision-making ability of Guidance and Counseling (BK) teachers in Dumai City schools. Data was obtained from 50 BK teachers through pretest and posttest measurements. The pretest is given before the BK teacher uses the application, while the posttest is given after the BK teacher participates in the use of a website-based counseling application using the forward chaining method.

Before the differential test is carried out, the data is first tested for normality. The normality test was performed using Shapiro-Wilk. The results of the normality test are presented in Table 2.

Table 2. Normality Test Results of Pretest and Posttest Data

Data	Shapiro-Wilk Statistic	df	Sig.
Pretest	0,983	50	0,702
Posttest	0,965	50	0,144

Based on Table 2, the significance value of Shapiro-Wilk in the pretest data was 0.702 and in the posttest data was 0.144. Both values are greater than 0.05, so the pretest and posttest data are distributed normally. Thus, the data meets the assumption of normality and the analysis can be continued using the paired sample t-test.

Furthermore, descriptive statistics were used to see an overview of the decision-making ability of BK teachers before and after using the application. The results of descriptive statistics are presented in Table 3.

Table 3. Descriptive Statistics Pretest, Posttest, and N-Gain

Statistics	Pretest	Posttest	N-Gain
N	50	50	50
Minimum score	30	69	0,48
Maximum value	55	96	0,91
Average	43,84	83,26	0,704
Standard deviation	5,08	4,88	0,077

Based on Table 3, the average pretest score of BK teachers' decision-making ability is 43,84, while the average posttest score increases to 83,26. The average increase of 39.42 points shows a considerable change after BK teachers use a website-based counseling application with the forward chaining method. The minimum pretest score of 30 increased to 69 in the posttest, while the maximum pretest score of 55 increased to 96 in the posttest. These results show that the increase occurred not only in the average score, but also in the overall range of respondents' achievements.

To determine the level of improvement in the decision-making ability of BK teachers, N-Gain calculation was carried out. The results of the distribution of the N-Gain category are presented in Table 4.

Table 4. Distribution of N-Gain Category

N-Gain Category	Value Range	Frequency	Percentage
Low	$g < 0,30$	0	0%
Medium	$0,30 \leq g \leq 0,70$	22	44%
Height	$g > 0,70$	28	56%
Total	-	50	100%

Based on Table 4, there are no respondents who are in the low category. A total of 22 BK teachers or 44% are in the medium category, while 28 BK teachers or 56% are in the high category. The average

N-Gain of 0.704 or 70.39% indicates that the improvement of BK teachers' decision-making ability is in the high category. Thus, descriptively the use of a website-based counseling application with the forward chaining method provides a strong improvement in the decision-making ability of BK teachers.

To find out the significance of the difference in pretest and posttest scores, a paired sample t-test was performed. The test results are presented in Table 5.

Table 5. Paired Sample t-Test Test Results

Data Pairs	t	df	Sig. (2-tailed)
Posttest - Pretest	59,982	49	< 0,001

Based on Table 5, the results of the paired sample t-test showed a t-value of 59,982 with  $df = 49$  and a significance value of  $< 0.001$ . Because the significance value is less than 0.05, there is a significant difference between the pretest and posttest scores of BK teachers' decision-making ability. Thus, an alternative hypothesis is accepted, namely the use of a website-based counseling application with the forward chaining method is effective in improving the decision-making ability of BK teachers in Dumai City schools.

## Discussion

The results of the study showed that the use of a website-based counseling application with the forward chaining method was effective in improving the decision-making ability of Guidance and Counseling (BK) teachers in Dumai City schools. This is shown by the increase in the average pretest score of 43,84 to 83,26 in the posttest, with an average difference of 39.42. The results of the paired sample t-test

showed a value of  $t(49) = 59,982$  with a significance of  $< 0.001$ , so it can be concluded that there is a significant difference between the decision-making ability of BK teachers before and after using the application. In addition, the average N-Gain value of 0.704 or 70,39% is in the high category. These findings show that a website-based counseling application with the forward chaining method not only provides statistical improvements, but also has a practical impact in helping BK teachers make service decisions more systematically, objectively, and data-driven.

The improvement of the decision-making ability of BK teachers can be explained through problem-solving theory. Heppner and Krauskopf (1987) Explains that problem solving is a cognitive process that involves receiving information, processing information, preparing solution plans, implementing actions, and evaluating results. In the context of BK services, BK teachers are faced with various complex student problems, such as academic, social, personal, emotional, discipline, learning motivation, and career planning. Each case requires an analysis process that cannot be done in a hurry. BK teachers need to understand the problem, identify emerging indicators, interpret the data, weigh service alternatives, and determine the most appropriate decision. A website-based counseling application with the forward chaining method helps BK teachers follow the process through a more structured flow.

The application used in this study can be accessed through [the https://bksolvemind.com](https://bksolvemind.com) address, while the admin or teacher login page can be accessed through <https://bksolvemind.com/admin/login>. Based on the application manual, this system is designed as a website-based problem

solving counseling guidance application that guides users in the process of problem identification, data filling, assessment, analysis, and recommendations. On the teacher's side, the application provides login features, dashboards, student data, class data, problem solving evaluations, student answers, and research instruments. On the student side, the application provides an assessment flow starting from logging in, starting a new assessment, filling out a statement, continuing the stages, to obtaining assessment results and recommendations. The flow shows that the application functions not only as a digital medium, but also as a support system for thinking and

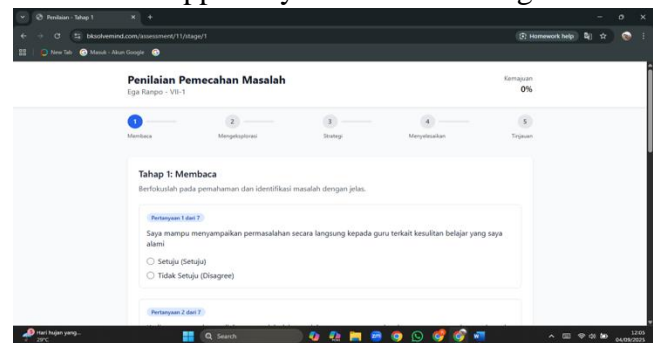


Figure 1. The BKSolveMind application login page is displayed.

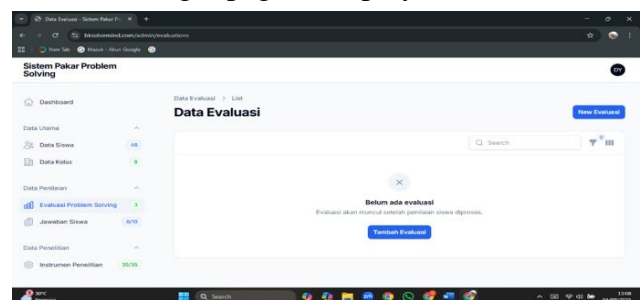


Figure 2. Teacher dashboard display in the application.

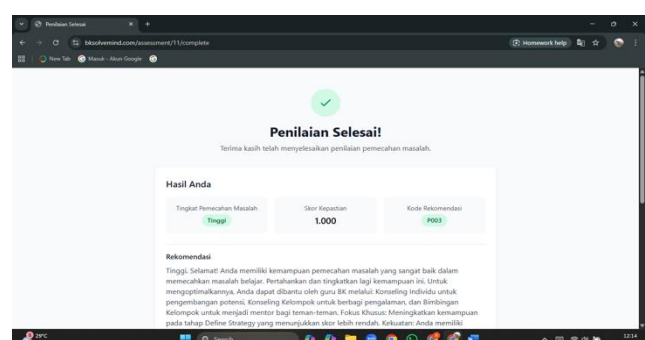


Figure 3. Display student data and class data on the application.

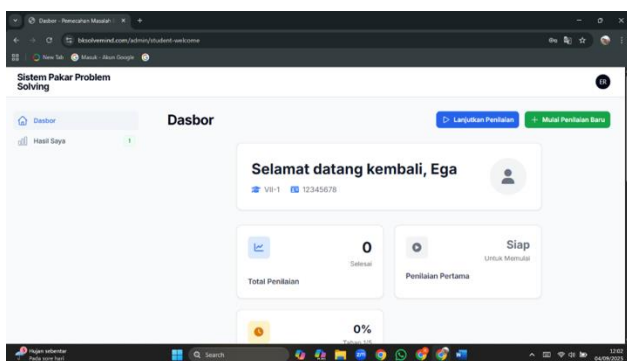


Figure 4. Display of the evaluation menu for problem solving and student answers.

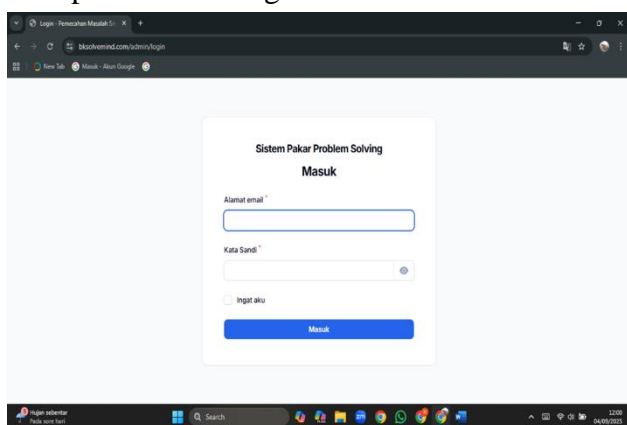


Figure 5. Display of filling out problem solving assessments by students.

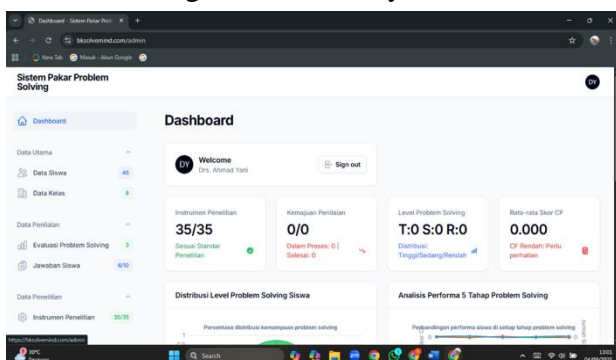


Figure 6. Display of assessment results and system recommendations.

Conceptually, the effectiveness of this application is closely related to the characteristics of the forward chaining method as a forward reasoning technique in a

rule-based expert system. This method works from the initial facts to the conclusion through the "if-then rules". In the context of BK services, initial facts can be student data, problem symptoms, academic conditions, social behavior, or emotional barriers. The data is processed by the system to produce service recommendations that can be used by BK teachers as a basis for consideration. Thus, BK teachers do not only rely on intuition, but are assisted by data-based analysis flows and more systematic rules (Anwar, 2021).

These findings are in line with rational decision-making theories that emphasize the importance of problem identification, information gathering, alternative consideration, decision selection, and decision evaluation (Simon, 1977). Website-based applications help BK teachers carry out these stages in a more targeted manner through login features, dashboards, student data, problem solving evaluations, student answers, and assessment results reports. This flow clarifies the work process of BK teachers in reading data, interpreting results, and determining appropriate services.

The results of this study can also be explained through the Cognitive Information Processing approach, which emphasizes that decision-making is influenced by an individual's ability to acquire, organize, process, and use information (Sampson et al., 1999). The BKSolveMind application helps BK teachers organize student information into clearer digital stages, so that the case analysis process becomes easier, documented, and reviewable. This strengthens data-driven decision-making practices in BK services.

In addition, this application can be positioned as a decision support system because it helps users manage data, search for problem indicators, and obtain alternative

service recommendations. The decision support system does not replace the professional role of BK teachers, but strengthens the quality of decisions through a more systematic structure of information and recommendations (Poszler & Lange, 2024). Therefore, the improvement of BK teachers' decision-making skills after using the application can be understood as a result of technological support that helps the process of thinking, analyzing, and determining services more objectively.

The documentation of implementation activities also shows that the application is used in activities with BK teachers in Dumai City. Application implementation and training activities are an important part because the success of technology in BK services is not only determined by the availability of applications, but also by the readiness of users. BK teachers need to understand how to access applications, enter data, read analysis results, and use recommendations as the basis for professional decisions.



Figure 7. Documentation of application implementation activities with BK teachers in Dumai City.



Figure 8. Documentation of the training atmosphere using the application.

## CONCLUSION

The findings of this study demonstrate that the website-based counseling application using the forward chaining method is effective in improving the decision-making ability of Guidance and Counseling teachers in schools in Dumai City. This conclusion is supported by the increase in the mean score from 43,84 in the pretest to 83,26 in the posttest, the significant result of the paired sample t-test with  $t = 59,982$  and  $p < 0,001$ , and the mean N-Gain score of 0,704, which is categorized as high.

Based on these results, the alternative hypothesis is accepted, while the null hypothesis is rejected. This means that the use of the website-based counseling application has a significant positive effect on teachers' ability to make decisions related to counseling services.

The main contribution of this study lies in positioning a website-based counseling application with the forward chaining method as a decision-support system in school counseling practices. Unlike previous studies that generally focused on technology as a medium for information, communication, or administration, this study highlights the role of rule-based technology in helping Guidance and Counseling teachers identify student problems, organize data, analyze problem indicators, and determine service

recommendations more systematically and objectively.

The results imply that the website-based counseling application using the forward chaining method can be used as a practical tool to support Guidance and Counseling teachers in making data-based service decisions. It is recommended that the application be further developed through wider implementation, integration with school counseling data systems, and continuous training for teachers to optimize its use in school counseling services.

## REFERENCES

- Anwar, M. (2021). Designing an expert system for determining student learning styles using forward chaining in engineering education. *Journal of Counseling and Education*, 9(1), 93. <https://doi.org/10.29210/159000>
- Campbell, D. T., & Stanley, J. C. (2011). *Experimental and quasi-experimental designs for research*. Wadsworth.
- Ethan, I. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Field, A. (2024). *Discovering statistics using IBM SPSS statistics* (6th edition). Sage.
- Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74. <https://doi.org/10.1119/1.18809>
- Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, 3, 275–285. <https://doi.org/10.1016/j.susoc.2022.05.004>
- Heppner, P. P., & Krauskopf, C. J. (1987). An Information-Processing Approach to Personal Problem Solving. *The Counseling Psychologist*, 15(3), 371–447. <https://doi.org/10.1177/0011000087153001>
- Hita Lafia Sarasvati & Rukiyati. (2024). The Role of Technology as a Media in the Practice of Counseling Guidance Services. *Scientific Journal of Counseling Guidance Undiksha*, 15(3), 348–361. <https://doi.org/10.23887/jibk.v15i3.87784>
- Khadijah, S., Widodo, W., & Sulistyowati, E. (2023). Web-Based Counseling Problem-Solving Model for Improving Mental Health in Students During the Covid-19 Pandemic. *IJNP (Indonesian Journal of Nursing Practices)*, 7(1). <https://doi.org/10.18196/ijnp.v7i1.18356>
- Mallen, M. J., Vogel, D. L., & Rochlen, A. B. (2005). The Practical Aspects of Online Counseling: Ethics, Training, Technology, and Competency. *The Counseling Psychologist*, 33(6), 776–818. <https://doi.org/10.1177/0011000005278625>
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? criticism and recommendations. *Research in Nursing & Health*, 29(5), 489–497. <https://doi.org/10.1002/nur.20147>
- Poszler, F., & Lange, B. (2024a). The impact of intelligent decision-support systems on humans' ethical decision-making: A systematic literature review and an integrated framework. *Technological Forecasting and Social Change*, 204, 123403. <https://doi.org/10.1016/j.techfore.2024.123403>
- Poszler, F., & Lange, B. (2024b). The impact of intelligent decision-support

- systems on humans' ethical decision-making: A systematic literature review and an integrated framework. *Technological Forecasting and Social Change*, 204, 123403. <https://doi.org/10.1016/j.techfore.2024.123403>
- Sabella, R. A., Poynton, T. A., & Isaacs, M. L. (2010). School counselors perceived importance of counseling technology competencies. *Computers in Human Behavior*, 26(4), 609–617. <https://doi.org/10.1016/j.chb.2009.12.014>
- Sampson, J. P., Lenz, J. G., Reardon, R. C., & Peterson, G. W. (1999). A Cognitive Information Processing Approach to Employment Problem Solving and Decision Making. *The Career Development Quarterly*, 48(1), 3–18. <https://doi.org/10.1002/j.2161-0045.1999.tb00271.x>
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2001). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.
- Shapiro, S. S., & Wilk, M. B. (1965). An Analysis of Variance Test for Normality (Complete Samples). *Biometrics*, 52(3/4), 591. <https://doi.org/10.2307/2333709>
- Shi, Q., & Brown, M. H. (2020). School Counselors' Impact on School-Level Academic Outcomes: Caseload and Use of Time. *Professional School Counseling*, 23(1\_part\_3), 1–8. <https://doi.org/10.1177/2156759x20904489>
- Simon, H. A. (1977). *The new science of management decision* (rev. ed). Prentice-Hall.
- Suryawati, C. T., Susilo, A. T., & Wijayanti, F. (2025). The Indonesian Journal of the Social Sciences Utilizing Digital Media for Guidance and Counseling in Education. *Peuradeun Scientific Journal*, 13(1). <https://doi.org/doi:%2010.26811/peuradeun.v13i1.1165%20Copyright>
- Vanlommel, K., Van Gasse, R., Vanhoof, J., & Van Petegem, P. (2017). Teachers' decision-making: Data based or intuition driven? *International Journal of Educational Research*, 83, 75–83. <https://doi.org/10.1016/j.ijer.2017.02.013>
- Yusoff, M. S. B. (2019). ABC of Content Validation and Content Validity Index Calculation. *Education in Medicine Journal*, 11(2), 49–54. <https://doi.org/10.21315/eimj2019.11.2.6>