Problem Solving Based Counseling Guidance Model With Forward Chaining For Critical Thinking Abilities

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ABSTRACT. The industrial revolution 5.0 requires learning not only focuses on achieving curriculum objectives, but also requires 21st century skills known as the 4Cs (*Crativity, Critical Thinking, Communication, Collaboration*) of students which include , thinking, creative thinking, and collaboration as well as *problem solving*. One of the biggest challenges in education today is improving *problem solving* skills in critical thinking. Learners are expected to have the ability to handle problems and find solutions. This research aims to produce a guidance and counseling model product with *problem solving* techniques using *forward chaning*. The research results of this product can be used by counselors and counseling teachers in solving student learning problems using applications so that 21st century skills known as 4C can be realized. This research is a Research and Development model which is a research model that produces certain products and tests the effectiveness of the products produced. The design used in this research is the 4-D model development research design (Four D Models). The 4-D stages of four steps: 1 Define, 2. Design, 3 Develop, 4. Disseminate. The website-based counseling service model can improve critical thinking in the learning process.

Keywords: BK Model, Problem Solving, Forward Chaining. Critical Thinking

ABSTRAK. Revolusi industri 5.0 menuntut dunia pendidikan dalam pembelajaran Yang tidak hanya berfokuslah pada pencapaian tujuan kurikulumnamun Juga dibutuhkan ketrampilan abad 21 yang dikenal dengan 4 CS (Crativity, Critical Thinking, Communication, Collaboration) pembelajar Yang meliputi communication, think Kritis, think creative, Dan collaboration dan problem solving. Salah satunya yang terbesar dalam momen pendidikan saat ini adalah waktu meningkatkan kemampuan memecahkan masalah (Problem Solving) dalam kemampuan berpikir kritis . Peserta didik diharapkan memiliki kemampuan Untuk menangani masalah Dan menemukan solusi Penelitian ini bertujuan untuk menghasilkan produk model bimbingan dan konseling dengan teknik pemecahan masalah menggunakan forward chaning . Harapannya produk ini dapat digunakan oleh konselor dan guru BK dalam menyelesaikan masalah belajar siswa dengan menggunakan aplikasi sehingga ketrampilan abad 21 yang dikenal dengan 4C dapat terwujud . Rancangan penelitian ini adalah model Penelitian dan Pengembangan dimana model penelitian menghasilkan produk tertentu dan menguji efektivitas produk yang dihasilkan. Desain yang digunakan dalam penelitian ini adalah desain penelitian pengembangan model 4-D (Four D Models). Tahapan 4-D terdiri dari empat langkah: 1 Tentukan, 2. Desain, 3 Kembangkan, 4. Menyebar.

Kata Kunci : Model BK, Penyelesaian Masalah, Penyelesaian lanjutan. Berpikir kritis

INTRODUCTION

To lead a successful life in society, students must not only have the appropriate information, but also different types of skills in a variety of areas that will enable them to succeed in today's rapidly changing environment. One of the biggest challenges in education today is improving *problem*

solving skills. Students must have the ability to deal with problems and find solutions (de la Peña Esteban et al., 2019). Students who have experience dealing with problems in learning can mentally prepare them to face problems in the real world (Kurniawati et al., 2019).

There are still many people who cannot become good problem solvers because they do not acquire the knowledge or skills necessary to solve problems in a way that is in line with their thinking (Huda et al., 2017). Problem solving ability is an essential ability that must be owned and improved by students (Hendriana et al., 2018). The level of students' ability in problem solving needs to be considered because problem solving ability is an essential skill that must be possessed and improved by students (Hendriana et al., 2018). one of the core skills in 21st century digital skills (van Laar et al., 2018; Kurniawati et al., 2019).

However, during the learning process, there are several problems faced by teachers in improving students' problem solving skills. Such as students' low ability to understand problems, students' weak analytical and critical thinking skills, and students who are not familiar with learning that develops problem solving skills (Hendriani & Marsyidin, 2023). In addition, the teacher-dominated learning approach also affects students' low problem solving skills (Husna & Burais, 2019). Riastini and Mustika (2017) in their research stated that problem solving is a process carried out by an individual to answer questions about a new situation using concepts, facts, and relationships that have been previously owned or obtained, and using various reasoning skills and strategies.

Guidance and Counseling (BK) is an integral component of the education system in each educational unit, which seeks to facilitate and empower students to achieve full and optimal development. As an integral component, the area of guidance and counseling is integrated in synergy with the area of administration and management services, as well as the area of curriculum and educational learning. The independent person in question is a person who is able to control themselves well and respond appropriately to environmental needs. Learners are ultimately expected to be able to achieve well-being in their lives (wellbeing).

The number of problems makes it difficult for counseling teachers to deal with the problems faced by large number of students. Therefore, a system is needed that can help adopt knowledge from the counseling teacher into expert system, so that other staff can assist the counseling teacher in counseling the student by entering the symptoms experienced by the student. One of the expert system methods that can be used is the *Forward Chaining* Method. This method is a search or inference method based on existing data (facts) towards , the search starts from existing facts then moves forward through several premises to get to the conclusion.

LITERATURE REVIEW

Guidance and Counseling

According to Prayitno and Amti (2004: 99) guidance is a process of providing assistance carried out by experts to one or several individuals, both children, adolescents, and adults. The goal is that the person being guided can develop his own and independent abilities by utilizing individual strengths and existing facilities and can be developed based on applicable norms.

Guidance can be defined as help or guidance. But not all help or guidance is guidance. Meaningful assistance always fulfills a series of conditions and principles such as: 1) guidance is a continuous, systematic, planned, and goal-directed process. So guidance activities are not activities that are carried out incidentally, at any time, accidentally, carelessly or haphazardly. 2) Guidance is a process of helping individuals. Helping in this case means that guidance is a voluntary activity and there is no element of coercion either from the guiding party (counselor) or from the guided party (counselee), (Rifda El Fiah, 2015: 1). Syamsu Yusuf (2009) says that counseling is a form of

relationship that is helpful. The meaning of help here is as an effort to help others so that they are able to grow in the direction of their own choice, able to solve the problems they face and able to deal with the crises experienced in their lives.

The counselor is to create the conditions necessary for the growth and development of the counselee. In Permendikbud No. 111 of 2014, it is explained that Guidance and Counseling as an integral part of education is an effort to facilitate and empower students in order to achieve full and optimal development. From several theories that have been presented, it can be concluded that guidance and counseling is an effort to provide assistance carried out by an expert, in this case a counselor to individuals (counselees), either individually or in groups, continuously and systematically, in solving their problems independently, and being able to develop and optimize the potential and abilities that exist in themselves in all aspects of life.

Prayitno and Amti (2004: 112) explain the general purpose of guidance and counseling is to help individuals to be independent with the characteristics of being able to understand and accept themselves and their environment, make realistic decisions and plans, direct themselves with their decisions and plans and ultimately direct themselves. While the specific objectives of counseling guidance are directly related to the direction of the development of the counselee and the problems faced.

According to Mulyadi (2016: 62), specifically guidance and counseling aims to help students achieve their developmental tasks through personal-social (affective), learning (academic/cognitive), and career (psychomotor) aspects. The purpose of guidance and counseling is to help individuals in order to find their personality so that they able to understand their strengths and weaknesses, can accept and respond positively, and finally can develop and actualize themselves further in their social life. Finding a person also means that the individual, besides being able to realize positive things in himself, can also accept the negative things that may be found in his person. (Rifda el fiah, 2015: 16).

Problem Solving

Krulik and Rudnick (1980) define *problem solving* as a means that individuals use based on their knowledge, skills, and understanding in unfamiliar situations. Riastini and Mustika (2017) in their research stated that problem solving is a process carried out by an individual to answer questions about a new situation using concepts, facts, and relationships that have been previously owned or obtained, and using various reasoning skills and strategies.

In addition, Girl et al (2002) stated that problem solving is a process that involves applying knowledge and skills to achieve goals. WIjayanti and Saraswati (2020) also suggested that *problem solving* technique is a way of providing understanding by stimulating students with the aim of paying attention, examining, and thinking about problem so that it is identified and then analyzing the problem as an effort to prevent problems and finally get systematic training of cognitive skills.

There are 5 stages in *problem solving* according to Krulik and Rudnick (1980). 1) The first stage is reading, which is when the individual tries to identify the problem. *Problem solvers* do this by knowing keywords, asking themselves what the is asking, or understanding the problem in a more understandable language. 2) The second stage is exploration, which is when individuals look at patterns to determine the efforts that play a role in the problem. 3) The third stage is determining the strategy, which is when individuals draw conclusions or make hypotheses about how to solve the problem based on what is found in the first and second stages. 4) The fourth stage is problem solving, where the individual carries out the method or method that has been chosen to solve the problem. 5) *The* fifth stage is *review* and *extend,* where individuals verify the problem-solving methods that have been carried out and see variations in problem-solving methods.

Factors that affect problem-solving ability According to Ormrod (2003), A person's ability to solve problems is influenced by several factors, including: 1) Memory ability. Since problem solving requires the ability to link various information, memory plays an important role. 2) Giving meaning at problem. The problem will more easier understood if they are represented in a meaningful way. 3) Individual understanding of information relevant to the problem. 4) The ability to recall information from long-term memory. This will be related to the knowledge that a person already has. Metacognitive processes, namely understanding of cognitive abilities and efforts to optimize these abilities

METHODOLOGY

This research is a development research by developing a guidance and counseling model in knowing the level of Problem Solving with a forword chaiming approach in improving students' critical thinking that meets valid and effective criteria. The procedure used in the development of this research refers to the 4-D development consisting of 4 stages, namely: define, design, develop, and disseminate. Instrument for the development of guidance and counseling models on problem solving based on forward chaming with a scientific approach. The step in the forward chaining approach is IF-THEN where the premise (IF) reaches the conclusion (THEN). The use of forward chainng can be done in two ways including if the expert system is connected to an automated process so that it receives all data from the database and can be included in the system, the second way is that only some important data is included in the system so that the second way is more efficient because it saves costs and time. The instrument developed consists of: instrument media validation sheet, validation of instrument indicator confidence values based on 3 levels of problem solving. In the first stage of the research target, the problem solving instrument expert validation test, in the second stage of revision, enter the expert validation test of the confidence score value by a team of experts in this study, psychologists and in the third stage conduct product trials. Some of the stages above can be described as follows:
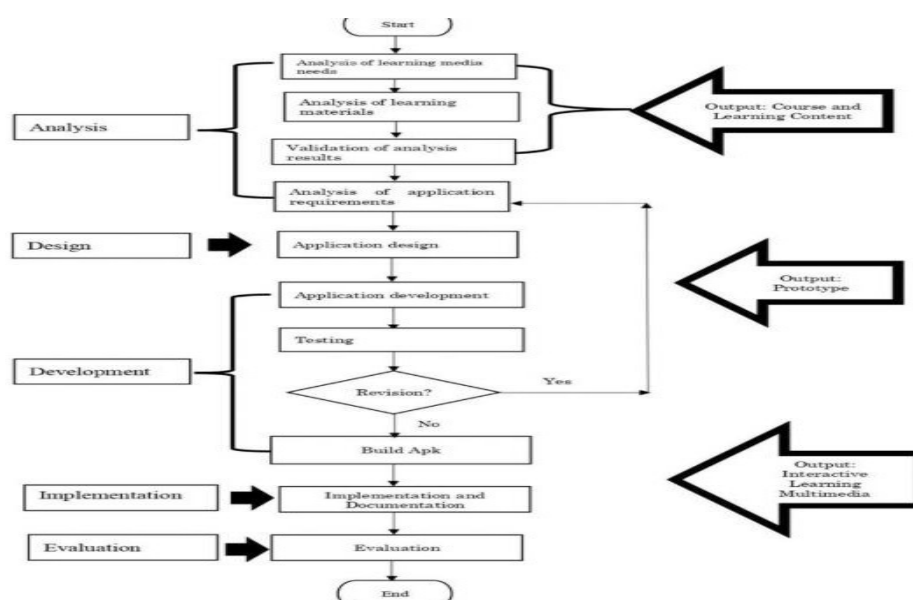
The action process was identified by o'brien (1998). Kemmis launched it by applying a simple model of natural cyclical combat research, each cycle of which consists of four phases: planning, action, observation, and reflection. Gerald susman outlines five steps in each cycle of action research. First, a problem is identified and data is collected for a more accurate diagnosis. This is followed by a series of assumptions. In short, the stages of action research consist of cycles of diagnosis (problem), action planning, action implementation, and evaluation. This entire cycle is

conducted based on the context and purpose of the action research being conducted. The steps of the development procedure in this study are as follows:
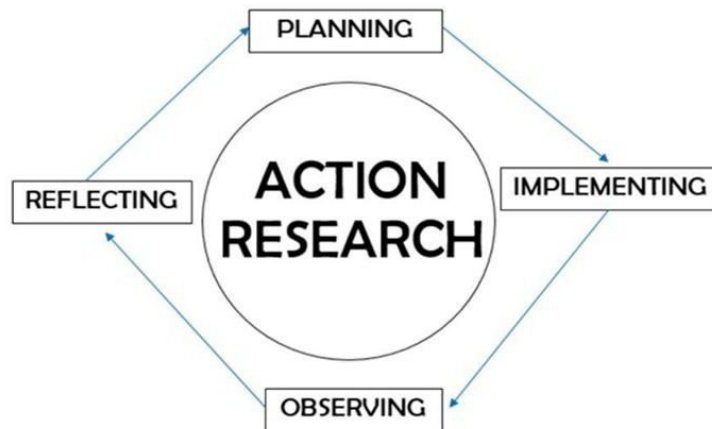
FINDINGS

Results of Development of Guidance and Counseling Model based on Problem Solving with Forword Chaiming in the ability to think

Define stage

At this stage in determining and defining the requirements carried out in the problem of problem solving students in the ability to think with forward chaiming. Next, analyze the objectives and limitations of the material. The activities carried out at this stage are preliminary end analysis, problem solving level analysis, and problem solving specifications.

Design Stages

At this stage, design a Probelem Solving-based Guidance and Counseling service model using the forward chaiming formulation. Media design in improving thinking skills after knowing the level of student problem solving. Activities at this stage include criteria for preparing test instruments, selecting media, selecting formats and initial designs that have been determined according to the initial objectives.

Development stage (Develop)

At this stage in producing an IT-based Guidance and Counseling service model with a forward chaiming approach after making revisions based on expert input and data obtained from the score value of the problem solvinf level consists of two consecutive stages, including: (1) expert assessment, used in the draft validation test instrument to be a feasible instrument in determining the level of problem solving, (2) scoring each instrument score given by a team of psychologist experts and then included in the forward chaiming formulation and used as the final draft.

DISCUSSION

The defining stage

This first stage is carried out as an effort to find out and define innovation needs on problem solving websites with forward chaining techniques so that it is very important in the innovation development process. In the initial step, a preliminary study was carried out related to the current

condition of student problem solving and development needs by producing innovative products in the form of a website in determining the level of student problem solving based on forward chaining. The initial step taken is to identify the needs and problems to be solved in order to determine the solution to be developed. In this context, namely with a technology-based approach using forward chaining which will then build an innovative website that functions as a tool in determining the level of students' problem solving ability itself.

The preliminary study was carried out by means of observation in seeing the obstacles experienced by students in dealing with personal and academic problems. Collaborating with bk teachers in digging for more in-depth information related to the need for tools that can help bk teachers in evaluating students' problem solving skills. The results in the field show that students still have a low level of problem solving skills, especially in overcoming learning and personal problems. Identification of problems found by guidance and counseling teachers in the field has difficulty in determining the level of student problem solving effectively. and systematic. This is due to the unavailability of tools that can provide in-depth analysis of students in solving their problems. The determination of the development objective is to develop a website based on the forward chaning technique. The website is designed to provide guidance to students in the problem solving process and assist bk teachers in analyzing and determining the level of students' problem solving skills accurately. The defining stage can develop products so that they can run as needed, provide benefits for students and bk teachers and increase the effectiveness of the mentoring process in improving ' problem solving skills.

Planning stage

Produce an innovative product in the form of a problem solving website that can be used by bk teachers in determining the level of problem solving that students have in an effort to achieve their goals. 3. Development stage

Development stage

This product has been designed (initial draft) will be discussed or validated to 2 experts from psychology and guidance and counseling. After the instrument is validated by two teams of experts, then the evaluation stage is carried out as the final stage. This stage aims to determine whether the innovative products developed by researchers are valid and practical to be applied for bk teachers in providing counseling services. For the validity level. Researchers asked for help from 2 expert validators. From the results of validation by experts, the results are obtained as in the table below:

Table: results of product validation by experts

Validator	Validation	Qualification
Content	85%	Valid and usable without revision
Language	80%	Valid and usable without revision
Design	90%	Valid and usable without revision
Total (%)	255%	
Average Product Validity	85%	

Dissemination stage

The innovation dissemination stage in the form of a problem solving website with a forward chaining technique approach in the implementation of guidance and counseling services for counseling teachers for students in measuring the level of student problem solving. The purpose of this product dissemination stage is to assist counseling teachers in helping determine the level

of student problem solving and for students to analyze the level of personal and academic problem solving.

CONCLUSIONS

The results of the study concluded that the problem solving-based guidance and counseling model with forward chaiming in improving students' critical thinking achieved valid and effective indicators, namely: students recognize the level of problem solving with the Guidance and Counseling Service model, students can improve critical thinking in the learning process, The product can be used by counseling teachers in a probelum solving-based guidance and counseling model in improving critical thinking.

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