Expert System for Identifying Students' Behavior and Personality through Cased-Based Reasoning at the State Junior High School 5 Bandar Lampung

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Abstract: Expert system was the system designed to emulate the expertise belonging to experts in answering questions and solving problems. This expert system provided solutions to the problems obtained from dialogues among users. This expert system was used because it contained knowledge, facts, and reasoning techniques to solve the problems and to transfer the experts' ability to the computer. The expert system brought persons who were not an expert to be able to answer questions, solve problems, and make decisions that are usually made by the experts. The State Junior High School 5 Bandar Lampung was one of the institutions engaged in the educational sector. In principle, The State Junior High School 5 Bandar Lampung always attempted to provide the best learning according to the students' needs (e.g., giving advice to students in controlling themselves to behave and have a good personality in the school environment). The State Junior High School 5 Bandar Lampung carried out the learning and teaching processes for a long period of time. Moreover, the State Junior High School 5 Bandar Lampung also provided a good-learning quality for students through the expert system for identifying the student behavior and personality in State Junior High School 5 Bandar Lampung. It was expected that the students were able to control themselves in behaving and having good personalities so that they were able to develop the students in the learning processes.

Keywords: Expert system, Case-Based Reasoning

1. INTRODUCTION

Artificial Intelligence was a process in which mechanical equipment carried out events through human-like thinking or intelligence. The fields of applied artificial intelligence included Expert Systems (expert systems), Natural Language Processing (scientific language processing), Computer Visio (interpreting images via computers), Intelligence Computer Aided Instruction (tutors in training and teaching), Speech Recognition (speech recognition), Robotics and Sensory Systems (robotics and sensor systems). An expert system was applied to support problem solving activities. At the present time, the development of technology and communication from time to time increased rapidly, especially in the developments of computer technology that encouraged the use and utilization of these technological developments widely in various fields and aspects of life. One of the examples of the use of technological developments was the computer applied in the psychiatric realm. In practice, psychology was still largely using old methods for processing the understanding and studying the psychological side of an object. This object was a human being with all his attitudes and behavior. One of the old methods that were still widely used in psychology was by making questionnaire sheets or a series of questions given to the object. The questionnaires were filled in by each object and were re-collected and added up. The conclusion was obtained from the sum of these values. This was inefficient and took a long time in the process. In addition, a feeling of saturation was also prone to occur during the process which may have an impact on the conclusions

An expert system was able to handle problems that facilitated the decision making related to students' behavior or personality at school. According to Abu Ahmad in the Indonesian technology journal in June 2017, he stated that Artificial Intelligence (AI) was a technique used to imitate the intelligence possessed by living things and inanimate objects to solve a problem and there were at least three methods developed e.g., Fuzzy Logic (FL), Evolutionary Computing (EC), and Machine Learning (ML) [1]. Tri Ginanjar Laksana, Devie Inka Permata which was stated in the journal SENAPATI 2016 regarding an expert system which stated that "Identifying Student Personality Through the Application of Expert Systems with Forward Chaining Techniques helped make decisions in identifying student personality optimally [2]. Jesreel Surbakti and Aqwam Rosadi Kardian in their journals explained that the system (expert system) was an information system

that contained expert knowledge so that it was able to be used for consultation. The expert knowledge in this system was used as a basis by the Expert System to answer questions (consultation). Expertise was extensive and specific knowledge acquired through a series of training, reading and experience. Knowledge enabled experts to make decisions better and faster than non-experts in solving complex problems [3]. According to Dian Topani in her journal, she stated that an expert system was a device that was able to solve problems according to certain expertise based on the knowledge of an expert [4]. The expert system was one of the fields of artificial intelligence or Artificial Intelligence (AI) which seeked to adopt human knowledge to computers, combining knowledge, and tracing data to solve problems that normally required human expertise [5]. According to research by Roki Hardianto and Candra Kusuma, it was stated that the results of a psychologist's diagnosis of personality, converted into a computer system greatly assisted psychologists in conducting personality diagnoses [6].

The problems discussed in the world of education did not seem to be fully able to answer various problems due to current technological developments. The indication was the appearance of various deviations in behavior among school students that should not be carried out by individuals or people who were called educated. Behavior and personality were very important for junior high school students, both individually and in groups, so that it was independent and developed optimally, through various types of services and supported activities based on prevailing norms. SMP Negeri 5 Bandar Lampung consisted of 6 counseling guidance teachers with 921 students who were divided into 10 class VII, 11 class VIII and 11 class IX. Therefore, all of the students' behavior and personality were difficult to be monitored by the teacher, especially the Counseling teacher. The current problem was that the counseling teacher had not been optimal in taking or mapping a preventive action for students so that the counseling teacher tended to act after an irregularity occurred by students i.e., fights, bullying, fighting teachers, and other disgraceful actions. The large number of students and the limited number of Counseling teachers were one of the obstacles in managing and mapping the potential of each of these students.

2. LITERATURE REVIEW

2.1 Overview of Personality

The term personality came from the Latin word "persona" which meant mask - a face cover often used by stage performers to describe a person's behavior, characters, or personality. Personality was a person's unique characteristics and behavior that distinguished a person from others [7] Student personality was an overall impression of himself seen in the attitudes and behavior of everyday life. By recognizing the personality and character of a person, a person was able to find out what their potentials and deficiencies are and what the steps were taken to develop their potential and manage existing deficiencies [8]
Personality was also defined as a characteristic of a person that causes consistency of feelings, thoughts and behavior (Pervin, Cervone, John, 2004; p. 6).

2.2 Basic Concept of Expert System

Expert System was a part of the artificial intelligence and was the right method to solve problems which began with the search processes from a set of data or facts from the obtained data. Furthermore, it also determined the conclusions that became the solution to the problems. The expert system was the system that used human knowledge in which this knowledge was entered into a computer and then used to solve problems that usually required human expertise or expertise [1].

Expert system was decision-making or problem-solving software packages that were able to achieve a level of performance equal to or even more than human experts in some special fields and usually narrow the problem areas [4]. An Expert System was a knowledge-based program that provided expert quality solutions to problems in a specific domain. An expert system was a computer program that mimics the thought process and expert knowledge in solving a particular problem [9] Basically an expert system was applied to support problem solving activities.

Some of these solving activities included: decision making, knowledge fusing, designing, planning (plainning), forecasting, regulating, controlling, diagnosis (diagnosing), formulation (prescribing), explanation (explaining), giving advice (advising) and training (tutoring). In addition, the expert system can also function as a clever assistant of an expert (Martin and Oxman, 2008, quoted from Musatafa 2013).

2.3 Basic Case-Based Reasoning

The results of a research showed that the Case-Based Reasoning method was able to predict and determine the interests and talents according to the abilities of these students [5]. New problems were solved by reusing and possibly making adjustments to problems that had similarities that had been resolved previously. CBR was a reasoning model that combined problem solving, understanding and learning, and integrated all of this with memory processing. Case-Based Reasoning (CBR) is the method for problem remembering similar events that had occurred in the past and then using that knowledge / information to solve new problems, or in other words, solved problems by adapting solutions that had been used in the past.

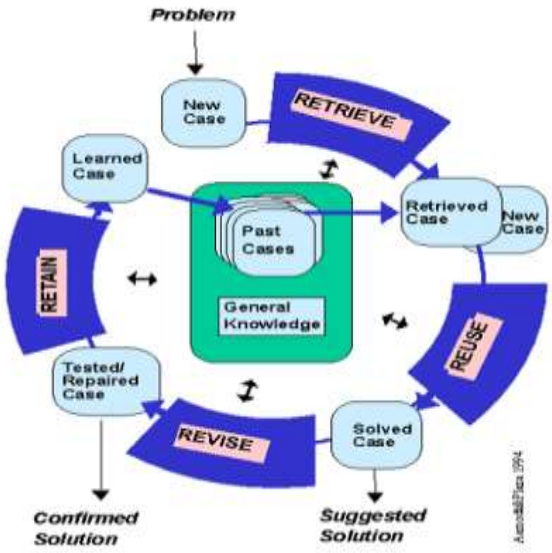

Figure.1 Case-Based Reasoning

3. METHOD

In this study, the method of observation, questionnaire, and weighting was used. The method used in this research was Case-Based Reasoning where the CBR method had 4 stages including [12]:

a. Retrieve. This stage was the first step of using the CBR method. The first step was that the users selected or inputted the symptoms of his daily human attitudes and behavior. Furthermore, the system processed it by matching old cases which had almost the same similarity value.
   The Case Based Reasoning calculation was used during:
   1. The first process was finding first value on the probability of each personality type
   2. In the second process, after getting the probability value of each personality type, the probability of the same symptoms was sought
   3. In the third process, the probability value of all personality types was sought
   4. The next process was looking for the probability value of the same symptoms as a whole
   5. The next process was finding the final value for each case
   6. In the last process, the final probability value of personality was sought

b. Reuse. The closest case with the highest accuracy value was selected and the handling solution also appeared.

c. Revise. This revise stage was the process to find new symptoms during input in the initial process. It was checked by an expert as material for consideration.

d. Retain. After getting the correct solution from the expert, it was entered back into the knowledge-based system which was used in future cases.

Figure.2 Research Framework

4. RESULT AND DISCUSSION

This study used the data from the Counseling field book which contained guidelines for the weight of student violations from which there were 8 types of violations and the weight of each of these violations.. From this weighting, it generated information about the type of personality of the students. In conducting the research, the method used in this research was the method of observation, assessment, and questionnaires to students in the school environment.

The explanation of each personality type was presented as follows:

1. Extraversion Personality A person who had a high extraversion score tended to be friendly and open and spends a lot of time maintaining and enjoying a number of relationships. Those with low scores tended to be less open and had fewer relationships. In addition, they preferred being alone.
2. The personality of neuralism. This type assessed emotional stability and instability to identify individual tendencies whether the individual tended to be stressed, had unrealistic ideas, and had non-adaptive coping responses. This dimension accommodated a person's ability to withstand stress. Those with high N scores tended to be calm, passionate, and safe. Meanwhile, those with low N scores tended to be depressed, anxious, and insecure.
3. Open Personality. This type assessed his efforts proactively and appreciated experiences for his own benefit. They tended to explore something new and unusual. Those who had high scores on openness tended to be imaginative, really sensitive, and intellectual. Meanwhile, those who had low scores on openness tend to be realistic, not creative, and not curious about something.
4. Agreeable Personality. This type assessed the quality of an individual's orientation with a continuum of values from gentle to antagonistic in thinking, feeling, and behavior.
3. This dimension referred to a person's tendency to submit to the others. Those with high A scores tended to appreciated harmony much more than their words or mannerisms. They were classified as cooperative people and believe in others. Those with low A scores tended to focus more on their own needs than on the needs of others.
4. Conscientious Personality. This type assessed the ability of individuals within the organization, both regarding persistence and motivation in achieving goals as direct behavior. On the other hands, the other individual was dependent, lazy, and untidy. This dimension referred to the number of goals that were the center of one's attention. High scoring people tended to listen to their conscience and pursue few goals in a purposeful way and tended to be responsible, resilient, dependent, and achievement-oriented. Those who had low scores tended to be more distracted, pursue multiple goals, and were more edonistic.

4.1 The Implementation Software

Figure.3 Picture Front Web Software

Figure 3 explained the behavioral and personality indications that the data processing was based on the criteria determined by the school.

Figure.4 Implementation

Figure 4 explained the information on the results of the criteria so that it was in the knowledge-based system that was used to obtain results from identifying the behavior and personality of the school students.

5. CONCLUSIONS

This Research assisted Counseling teachers in analyzing, identifying, and providing solutions about the behavior and personality of their students. It was also used as an early detection tool for student behavior and personality.

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