Analysis of Expert System Design Using Certainty Factor Methods in Determining Early Childhood Learning Styles

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ABSTRACT

In this study the authors made an application using an expert system to determine early childhood learning styles using certainty factor methods. Where the authors apply the knowledge of psychologists to analyze early childhood learning styles. With this research can help parents and teachers know about children's learning styles, by answering questions from the application then the user answers will be processed by the system and the system will display conclusions about the ability of children's learning styles that exist in these children along with information about appropriate teaching methods based on the results of the diagnosis. For the method used is the Certainty Factor method using this method because it wants to create a system that can describe the level of expert confidence in a problem in this case to determine the learning style of early childhood through the criteria of children who appear to children. As for the results of the study: The system designed can be used very easily, so that the community can use this system to produce reports on Determining Early Childhood Learning Styles, with the existence of this system can also save community costs, because there is no need to go to a psychologist just for consultation. The test results "Expert System Determines Early Childhood Learning Styles Using Certainty Factor Method" shows that this expert system can Determine Early Childhood Learning Styles in accordance with the answers given by users with an accuracy value of 91%.

Keywords : Expert System, Certainty Factor, Childhood Learning Styles

INTRODUCTION

Expert system is one part of artificial intelligence that contains the knowledge and experience provided by one or many experts into one particular area of knowledge so that everyone can be used to solve various specific problems

Learning is a process for changing one's behavior, both physical and inward. Change to good, from bad to good. The process of change is relatively permanent in the sense that the benefits obtained last long and the process of change is carried out adaptively, not ignoring the environmental conditions. These changes occur because of the accumulation of one's experience when interacting with the surrounding environment.

The certainty factor was introduced by Shortliffe Buchanan in making MYCIN. Certainty Factor (CF) is a clinical parameter value given by MYCIN to show the amount of trust. CF shows the measure of certainty of a fact or rule.

Microsoft Visual Studio is complete software (suite) that can be used to develop applications, be it business applications, personal applications, or application components, in the form of applications console, Windows application, or Web application. Visual Studio includes a compiler, Software Development Kit (SDK), Integrated Development Environment (IDE), and documentation (generally in the form of MSDN Library).

RESEARCH BACKGROUND

In this study the authors made an application using an expert system to determine early childhood learning styles using certainty factor methods. Where the authors apply the knowledge of psychologists to analyze early childhood learning styles. With this research can help parents and teachers know about children's learning styles, by answering questions from the application then the user answers will be processed by the system and the system will display conclusions about the ability of children's learning styles that exist in these children along with information about appropriate teaching methods based on results.

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RESEARCH METHODS

To obtain the data needed in writing this research, the authors use several methods, as follows:

Field Research

1. Observations, the author makes observations about system design and application concepts and some of the devices used to build the system.
2. Interview done by holding direct communication with Ms. Zuraida, M.Psi as a psychologist. Some questions were asked as follows:
   a. There are several types of learning styles in children?
   b. What are the characteristics of each learning style in children?

Library Research

The author conducted a literature study to obtain data relating to research from various sources such as: books, files, research journals, reports relating to the title raised as a reference.

RESULT

In this study the authors made an application using an expert system to determine early childhood learning styles using certainty factor methods. Where the authors apply the knowledge of psychologists to analyze early childhood learning styles. With this research can help parents and teachers know about children's learning styles, by answering questions from the application then the user answers will be processed by the system and the system will display conclusions about the ability of children's learning styles that exist in these children along with information about appropriate teaching methods based on the results of the diagnosis.

Application of the Method

1. Formula *Certainty Factor*

Certainty factor introduce the concepts of beliefs and uncertainties which are then formulated in the following basic formulation:

CF [H,E]= MB[H,E] – MD[H,E]

Infrmation:

CF[H,E]　　: *certainty factor hypotheses that are influenced by evidence e are known with certainty.*

MB[H,E]　　: *measure of belief on hypothesis H, if given E evidence (between 0 and 1)*

MD　　: *Measure of Disbelief (Distrust Value)*

P　　: *Probability*

E　　: *Evidence (Fact)*

To determine the information of an expert confidence factor, it is seen from CF combine based on certainty factor interpretation tables. The table can be seen in the following table.

No.	Certainty Term	CF_{result}
1.	Certainly Not	-1,0
2.	Almost Certainly Not	-0,8
3.	Most Likely Not	-0,6
4.	Probably Not	-0,4
5.	Don't Know / Not Sure	-0,2 --- 0,2
6.	Maybe	0,4
7.	Most Likely	0,6
8.	Almost Certainly	0,8
9.	Certainly	1,0

2. Manual Or Counting Process Implementation Method *Certainty Factor* (CF)

In the learning style diagnostic session, the user is given a choice of interpretations, each of which has a CF value as follows:

-	Really Not Sure	=	0.0
-	(Yes) Not Sure	=	0.1
-	(Yes) Not Sure	=	0.2
-	(Yes) Not Sure	=	0.3
-	(Yes) Probably Sure	=	0.4
-	(Yes) Probably Sure	=	0.5
-	(Yes) Sure Enough	=	0.6
-	(Yes) Sure Enough	=	0.7
-	(Yes) Sure	=	0.8
-	(Yes) Sure	=	0.9
-	(Yes) Very Sure	=	1.0

3. Categorizing Characters

Id_Karak Ter	Character	Study Style Categorizing
K01	Speaking with fast tempo	Visual
K02	Speaking with moderate tempo	Auditory
K03	Speaking with slow tempo	Kinestetic
K04	Often say things that look good	Visual
K05	Often say something that tastes good	Kinestetic
K06	Often say something that sounds good	Auditory
K07	Easy to remember things to see	Visual
K08	Easy to remember things to do	Kinestetic
K09	Easy to remember what was heard	Auditory
K10	More impressed with events, emotions and events	Kinestetic
K11	More impressed with people, environment and face	Visual
K12	More impressed by the sound and name	Auditory
K13	Very like painting	Visual
K14	Very like dancing	Kinestetic
K15	Very like music	Auditory
K16	Tend to pay attention to people on the face and clothes worn	Visual
K17	Tends to pay attention to people in their behavior and gestures	Kinestetic
K18	Tends to pay attention to people in their conversation	Auditory
K19	It's good to memorize something by repeating words out loud	Auditory
K20	Happy to memorize something by writing	Visual

Suggestions for each learning style

Id_Anj	Suggestions	Study Style
A01	If the reading is full of boring writing for you, say what you are reading so that it can be heard in private then you need silence in this matter	Auditory
A02	Try not to record what you hear right away, but listen carefully first	Auditory
A03	Multiply channeling energy through body movements such as gymnastics	Kinestetic
A04	Fill your free time by reading favorite books and magazines that make your eyes traveled	Visual
A05	If you look something bad or messy, don't pay too much attention because it can interfere with your mood	Visual
A06	Fill your free time with activities on outside that tests physical strength	Kinestetic
A07	You should immediately record all the information you hear, for example when the teacher explains any theory	Visual
A08	Say what you want to memorize or make a song rhythm in memorizing the formula	Auditory
A09	If reading is full of boring writing for you, try coloring some important sentences in the reading neatly	Auditory
A10	In memorizing something, make a stroke every time you memorize something, so you remember	Visual
A11	In order to linger in memorization, keep accustomed to memorizing while walking while not disturbing others	Kinestetic
A12	If in learning in a classroom demanding to stay long, to be more relaxed, you can just shake your legs, as long as it doesn't bother other people	Kinestetic
A13	In assembling something (robot, car and other toys) You tend to practice making it right away, but if you experience failure, you should look at the example diagram carefully	Kinestetic
A14	It turns out you prefer to see the groove diagram in assembling something, this shows you have the nature of Visual Learning Styles, so usually you have a talent in drawing diagrams	Visual
A15	You need an explanation from someone inside assemble something like (robots, cars, and other toys)	Auditory
A16	Get used to saying what back the information you receive, it doesn't need to be loud enough to be heard in private so that you remember	Auditory
A17	You need to listen to your favorite music in learning, to be more relaxed and not easily bored	Auditory
A18	If you study, you play music and your parents think you are not concentrated in learning, then give a good understanding of how you learn	Auditory
A19	You occasionally need to study outside the home or outdoors, especially when studying biology, you need to understand the environment or plants firsthand	Kinestetic

Design System

At this stage the design of the proposed system will be carried out. The design of this system is described by the Unified Modeling Language (UML) which includes Use Case diagrams. Diagrams that illustrate actors, use cases and their relationships as a sequence of actions that provides measurable values for actors.
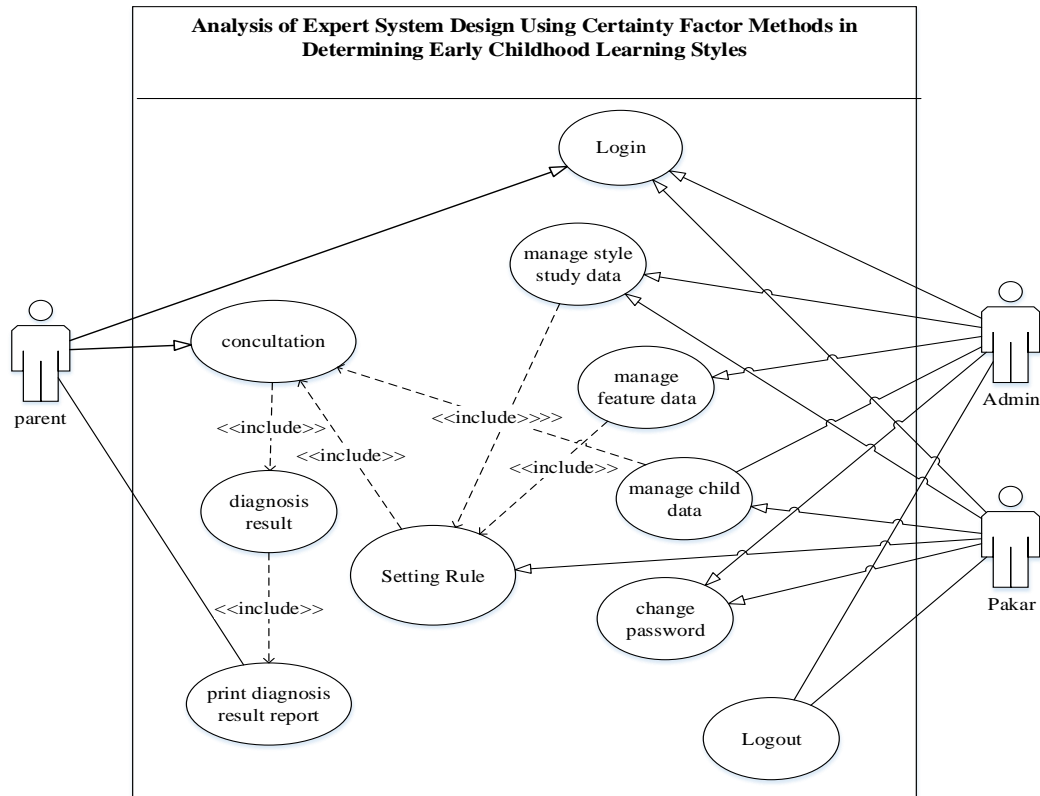

Ficture 1. Use Case Diagram

Consultation Form Display

This display is a consultation form display, serves to carry out consultations based on the questions given

Ficture 2. *Form* **Consultation**

Display Consultation Results Form

This display is a form of consultation results, serves to find out the results of consultations based on the consultation stage previously carried out, and print the consultation results

Ficture 3. *Form* Result

The system built helps users to find out about handling Determining Early Childhood Learning Styles, making it easier for users to consult without having to meet a psychologist. Each question that is found during the consultation is stored in a database and grouped according to the results of the consultation, so that the user can quickly find answers to solutions to determine Early Childhood Learning Styles through the features found. The system built provides convenience in making reports on the results of consultations that have been done by users Determining Early Childhood Learning Styles.

CONCLUSION

Application Design Determines Early Childhood Learning Styles Using the Certainty Factor Method. Where this system was made in order to make it easier for the public to get information about Early Childhood Learning Styles, it is hoped that with this system that has been built it can also increase the public knowledge of parents in determining Early Childhood Learning Styles. The test results "Expert System Determines Early Childhood Learning Styles Using Certainty Factor Method" shows that this expert system can Determine Early Childhood Learning Styles

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