

Expert System Application Prototype to Categorize Children with Special Needs

Dian Atnantomi W¹, Abdul Salim², Nunuk Suryani³

¹(Special Education Program, Graduate School, Universitas Sebelas Maret)

^{2,3}(Teacher Training and Education Faculty, Sebelas Maret University, Indonesia)

Abstract

It is an R & D (Research and Development) research consisting of three steps, namely preliminary study, designing, and product development. Expert system application development is aimed to categorize children with special needs. Expert system application is used to determine proper intervention based on children's disability. This application can support teachers' duty in identifying children and deciding intervention and also educational services for those with special needs.

Keywords: *expert system application, category, children with special needs*

I. INTRODUCTION

Expert system is a computer based system using knowledge, facts, and logical technique in solving problem that can be solved only by expert system in particular field, i.g. education and health [13]. Expert system is a system trying to adopt human knowledge into computer system so that the computer can solve problem and give solutions as what the experts do [13]. Some problem solving activities are decision making, knowledge fusing, designing, planning, forecasting, regulating, controlling, diagnosing or identification, prescribing, explaining, advising, and tutoring. Basically, expert system has the most application to solve problems in real life [19].

Expert system is made in some particular knowledge for particular expert near to human ability in one field (education, health, economy, etc). Expert system tries to find solutions as what an expert do based on data base. Expert system can also give explanation about steps taken and give solution of conclusions or suggestion based on the problem. Usually, expert system is only used to solve difficult problem. It adopts human knowledge to computer as what experts do. With this expert system, everyone can solve their problem and if they need informaton. It will also help experts activity as their professional assistance.

Expert system combines inference rules by particular knowledge basis given by one or more experts of particular field based on database.

Combination from both will be saved in computer and it is used to solve difficult problem. Practically, expert system is used to solve problem by giving correct information according to students' condition [6][11]. The advantage of expert system in education a world is to solve students' problem, so teachers can give suitable intervention [11]. Identification and IQ level and also interest and class based on students' ability can be done by expert system based on database [9][17]. Expert system's ability in solving problem based on data base can help teachers at inclusive school to identify and give learning intervention for students with special needs.

From previous study, expert system can provide information of all factors and problems to decide suitable intervention and assessment [7]. Main focus of web based expert system is to solve students' problem, because from information obtained from identification process (characteristics, placement, learning media, evaluation, and problems) [3]. Information containing students' condition from web based expert system can be reference to help teachers in inclusive school in doing learning intervention. Expert system application give recommendation about class and learning design according to students' intellectual condition [5][4]. Expert system can be used to give recommendation of academical plan about proper learning option for students [2].

Class placement for new students can be done with expert system application. The system gives recommendation about class and learning design according to students' intellectual condition [5][4]. Expert system can be used to give recommendation of academical plan about proper learning option for students [2]. It gives picture of students' interest and IQ as being mentioned by Nugraha and Herlawati in their research [17]. In the identification process, expert system can be used to identify students' behavior and characteristics. It is important to know students' quality and ability so it can be used as guidance to manage learning strategy [1].

Expert system gives exercise recommendation suitable with education record from database and it is used to solve students' learning

problems [10]. The use of web based application determine subjects schedule recommendation and passing grade and also exercise and suitable intervention for students [3]. To decide suitable curriculum with students' condition, this system can be used [14][20]. In assessment process, web based expert system can provide learning result evaluation of students [7][8][16].

Expert system is implemented to explore disability or category faced by the children. Disability possess by children based on their characteristics. Children with special needs are children with disability in their physic, mental, or social behavior characteristics, or children which are different from most children because of problem in the way they think, see, hear, socialize, and moving [18]. Based on the definition, children have physical disability can be categorized into blind, mute, deaf, and physical disability. Children with special needs according to PKLK in Suyanto and Mudjito [15] consist of blind, deaf, mute, physical disability, emotional disorder, learning difficulty, slow learner, autism, and multidisabilities. Children with special needs can receive educational service in inclusive school and special school.

II. METHOD

This research is an R & D (Research and Development) research consisting of three steps, namely preliminary study, designing, and product development. It wil provide design and development of expert system application to categorize children with special needs.

III. RESULT AND DISCUSSION

A. Alogaritm Design of Expert System Application

Below is a alogaritm diagram of web based expert system application to identify children with special needs.

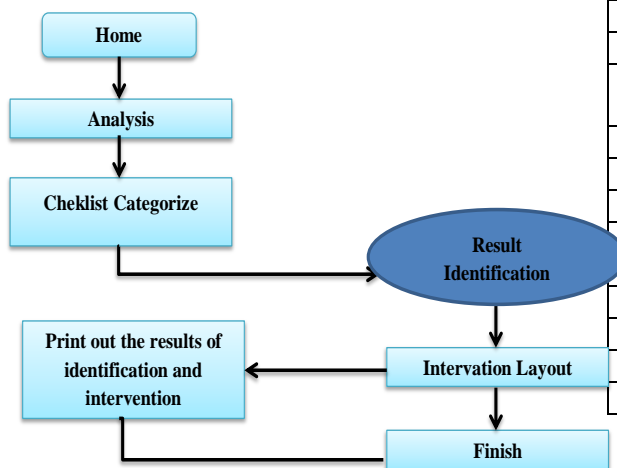


Diagram 1. Design of Expert System Alogaritm

Based on the diagram above, it can be elaborated as follows. First, to start expert system application, enter home contained analysis result and the next menu like analysis/identification of children with special needs. Second, main page of this expert system application is the part to process children's characteristics. Third, identification result of children with special needs is obtained from analysis and adjusted with suitable characteristics, so we can draw a conclusion based on the caharacteristics found. Fourth, after children are identified, it can be continued to determine learning intervention, evaluation, and suitable teuraphy according to their disability. Identification result and intervention recommendation can be printed as archieve for school. The data is saved in database and showed in front page (home).

B. Decision Tree of Expert System Application

In the development of expert system application, researcher used multi intelectual theory from Howard Gardner developed by expert to decide. Facts and behavior of children with special needs become parameter to take objective decision based on characteristics and behavior chosen by user according to identified children. Belows are contents from knowledge basis. Knowledge basis is facts and rules used by some experts based by obtained knowledge from experience. To represent used knowledge, production method used is in the form of If-Then [12].

Epert system application has decision tree from suitable characteristics with identified children's condition. Belows are categories of children with special needs (Code: ABK), characteristics (Code: K) and decision tree expert system application as follows.

Table 1. Category of Children with Special Needs

Kode	Category of Children with Special Needs
ABK 1	Blind
ABK 2	Deaf
ABK 3	Mild Mentally Retardid
ABK 4	Medium Mentally Retardid (Down Syndrom)
ABK 5	Orthopedically Handicapped
ABK 6	Behavioral disorders
ABK 7	Slow learn
ABK 8	Dyslexia
ABK 9	Dysgraphia
ABK 10	Discalculia
ABK 11	Gifted and Talented
ABK 12	Autism
ABK 13	ADHD

2) **Analysis Layout**

Analysis layout is main menu used by user to identify children with special needs. On analysis menu, there are some components namely, name, disability category, characteristics choices based on disability. User type in students' name and disability, after that choose characteristics based on their disability. Analysis menu can be shown as follows.

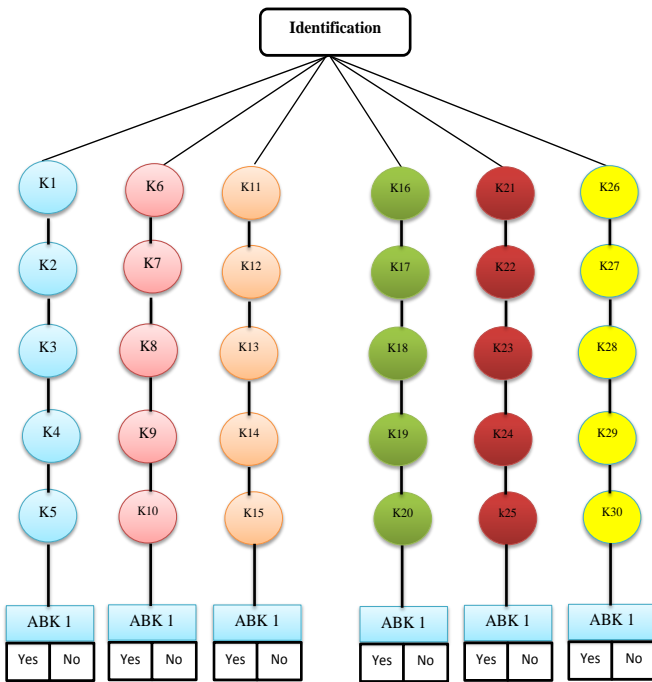


Diagram 2. Decision Tree of Expert System Application

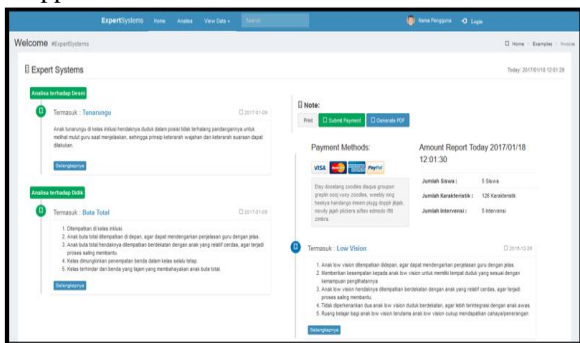
From expert decision tree, it can be produced some rules.

- Rule 1: IF K1 (Children's Characteristics 1)
- AND K2 (Children's Characteristics 2)
- AND K3 (Children's Characteristics 3)
- AND K4 (Children's Characteristics 4)
- AND K5 (Children's Characteristics 5)
- AND K so on (next Children's Characteristics)
- THEN more dominant children with special needs with characteristics 1 (ABK1) until rule 1.

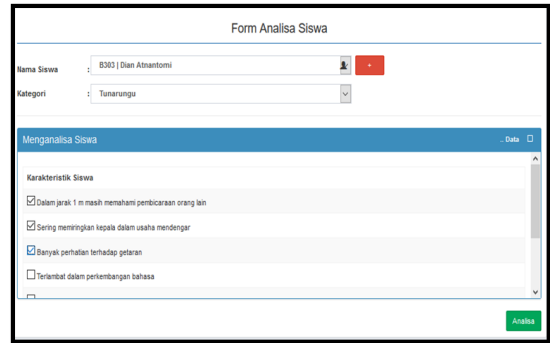
C. **Expert System Application Layout**

1) **Home Layout**

Home is contained menu options of analysis, data view, and analysis result. This page gives information about children with special needs, inclusive school, and video giving education for the user. Here is front page or home of expert system application

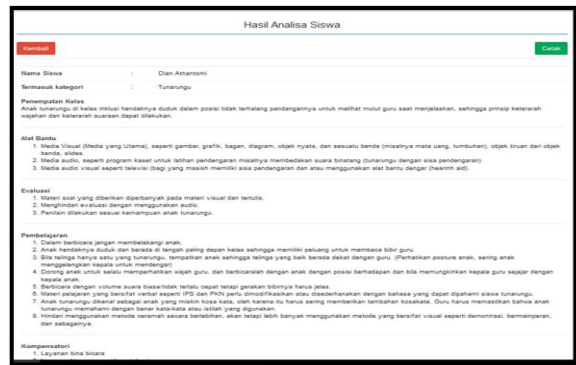


Picture 1. Home Layout



3) **Intervention Menu Layout**

Intervention menu layout in web based expert system application is connected with intervention recommendation that can be printed by user. In web based expert system application, this menu is additional feature to give easier service for user. Intervention menu layout can be seen as follows.



IV. **CONCLUSION**

Expert system application can be used to determine category or intervention of children with special needs according to their characteristics. It will give easiness for teacher to realise the category of children with special needs to give educational service based on their disability. Expert system application gives information about class placement, education, media, and therapy needed by children with special needs according to their category.

ACKNOWLEDGEMENTS

It is better for further research to develop expert system application in analyzing double category and more accurate to help teacher in identifying children with special needs.

REFERENCES

- [1] Adnandi, Muhammad Arba, Sistem Pakar Untuk Mengidentifikasi Perilaku Dan Kepribadian Siswa Pada SMK Negeri 2 Tangerang., Undergraduate, STMIK Raharja, 2015.
- [2] Al Ahmar, M. Ayman, A Prototype Student Advising Expert System Supported with an Object-Oriented Database, *International Journal of Advanced Computer Science and Applications*, Special Issue on Artificial Intelligence, 2 (3), 2011, 100 – 105.
- [3] Albaloooshi, Fawzi & Shatnawi, Safwan, HE-Advisor: A Multidisciplinary Web-Based Higher Education Advisory System, *Global Journal of Computer Science and Technology*, 10 (7), 2010, 37 – 49.
- [4] Al-Ghamdi, Abdullah., Al-Ghuribi, Sumaia., Fadel, Arwa., Al-Aswadi, Fatima & AL-Ruhaili, Thamary, An Expert System for Advising Postgraduate Students, *International Journal of Computer Science and Information Technologies*, 3 (3), 2012, 4529 – 4532.
- [5] Bouaiachi, Yousra., Khaldi, Mohamed & Azmani, Abdellah, A Prototype Expert System for Academic Orientation and Student Major Selection, *International Journal of Scientific & Engineering Research*. 5 (11), 2014, 25 – 28.
- [6] Campo-Ávila, José del., Conejo, Ricardo., Triguero, Francisco & Morales-Bueno, Rafael, Mining Web-based Educational Systems to Predict Student Learning Achievements, *International Journal of Artificial Intelligence and Interactive Multimedia*, 3 (2), 2015, 49 – 54.
- [7] Choudhury, Ridip Dev., Borbora, Khurshid Alam & Sarma, Shikhar Kumar, Expert System based Online Assessment System, *International Journal of Applied Information Systems*, 2 (1), 2012, 30 – 33.
- [8] Choudhury, Ridip Dev., Borbora, Khurshid Alam & Sarma, Shikhar Kumar, ESOA: A Web-Based Expert System for Online Assessment: Prototype Design and Implementation, *International Journal of Computer Science Engineering and Information Technology Research*, 3 (2), 2013, 449 – 458.
- [9] Daeli, Feresi, Sistem Pakar Dalam Menentukan Tingkat IQ Anak yang Mengalami Reterdasi Mental Dengan Metode Certainty Factor (Studi Kasus: Pendidikan SLB/B Karya Murni), *Pelita Informatika Budi Darma*, 4 (3), 2013, 43 – 47.
- [10] Daramola, Olawande., Emebo, Onyeka., Afolabi, Ibukun & Ayo, Charles, Implementation of an Intelligent Course Advisory Expert System, *International Journal of Advanced Research in Artificial Intelligence*, 3 (5), 2014, 6 – 12.
- [11] Goodarzi, Mahdi Hassani & Rafe, Vahid, Educational Advisor System Implemented by Web-Based Fuzzy Expert Systems, *Asian Journal of Information Technology*, 11 (2), 2012, 71 – 82.
- [12] Ignizio, James P, *Introduction to Expert Systems : the development and implementation of rule-based expert systems* (USA: McGraw-Hill, inc, 1991)
- [13] Kusriani, Sistem Pakar Teori dan Aplikasi (Yogyakarta: Andi, 2010)
- [14] Lightfoot, Jay M, A Web-Based Knowledge Management Tool Utilizing Concept Maps for On-Line Student Advising, *Journal of International Technology and Information Management*, 23 (1), 2014, 41 – 56.
- [15] Mudjito., Harizal & Elfindri, *Pendidikan Inklusif* (Jakarta: Baduose Media, 2012)
- [16] Muntoha, Muhammad., Akhlis, Isa & Subali, Bambang, Pengembangan Sistem Evaluasi Pembelajaran Berbasis Web (Web Based Learning Assessment System), *Prosiding Pertemuan Ilmiah XXIV, HFI Jateng & DIY*, 2010, 195 – 199.
- [17] Nugraha, Irham Cahya & Herlawati, Sistem Pakar Tes Minat dan Bakat Jurusan Kuliah Berbasis Android Pada SMA Islam Teratai Putih Global Bekasi, *Jurnal Teknik Komputer AMIK BSI*. 2 (1), 2016, 138 – 147.
- [18] Halalhan & Kauffman, *Exceptional Learners, An Introduction to Special Education*. Tenth Edition (Boston: Allyn & Bacon, 2006)
- [19] Siswanto, Ebook: *Buku Kecerdasan Tiruan*, Jilid II (STMIK Budi Luhur, 2010)
- [20] Susanti, Ariani, Perancangan Sistem Pendukung Keputusan Penentuan Jurusan Siswa SMA Negeri 2 Kutacane Berbasis Web Dengan Menggunakan Metode Analytical Hierarchy Process (AHP). *Pelita Informatika Budi Darma*, 9 (1), 2015, 159 – 167.