Designing and Developing Artificial Intelligence Applications Troubleshooting Computers as Learning Aids

Andri Eka Putra[1], Kasman Rukun[2], Dedy Irfan[3], Engkizar[4], Wirdati[5], Munawir K[6], Fahrul Usmi[7] & Azhar Jaafar @ Ramli[8]

[12345]*Universitas Negeri Padang, Indonesia*[6], *Universitas Islam Negeri Alauddin Makasar, Indonesia,*[7]*Widyaiswara Balai Diklat Keagamaan Padang Sumatera Barat, Indonesia &* [8]*University College of Yayasan Pahang, Malaysia*

ARTICLE INFO	ABSTRACT
	The learning to analyze problems and do improvements on hardware and installation of application software is part of the basic competencies of knowledge and skills of computers and basic networks. Based on observations, the learning process has not been able to provide a real picture of the problems that often occur on computers. The purpose of this study is to design and develop learning aids through artificial intelligence applications on computer troubleshooting. The research method used is R & D (Research and Development) with a 4-D model. The results of the study this is the application being valid, practical and effective. Based on the results of the study, it can be concluded that the application of artificial intelligence to computer troubleshooting has been successfully designed and developed.

Corresponding Author: Engkizar, Islamic Education Department, Faculty of Social Sciences, Universitas Negeri Padang, Indonesia, *Email:* engkizar@fis.unp.ac.id*,* Phone +62821-7131-4629.

1. Introduction

Basic Computer and Network subjects are one of the basic subjects in the Computer and Informatics Engineering Expertise Program (Wibawanto, 2017). Core Competencies and Basic Competencies in the Expertise Program (C2), are core competencies and basic competencies whose scope and depth of material and learning burden apply equally to all skills competencies that are in a program of expertise. The Computer and Informatics Engineering Expertise Program has four basic programs of expertise, namely Computer Systems, Computers and Basic Networks, Basic Programming and Basic Graphic Design (Kuhlemeier & Hemker, 2007; Jovanov et al. 2016).

The objectives of the curriculum include four aspects of competence, namely aspects of spiritual attitude competence, social attitudes, knowledge, and skills. Core Spiritual Attitude Competencies (KI-1) are formulated by live and practice the teachings of the religion he adheres to (Engkizar et al. 2018; Kasmar et al. 2019). Core Competence of Social Attitude (KI-2) is formulated by living and practicing honest behavior, discipline, courtesy, caring (mutual cooperation, cooperation, tolerance, peace), responsibility, responsiveness, and proactive through exemplary, giving advice, strengthening, habituating, and conditioning continuously and showing attitude as part from solutions to various problems in interacting effectively with the social and natural environment and in placing themselves as a reflection of the nation in world relations (Murniyetti et al. 2016; Damri et al. 2017) Both of these competencies were achieved through indirect learning, namely exemplary, habituation, and school culture, taking into account the characteristics of subjects and the needs and conditions of students (Aksu et al. 2012; Mainaki et al. 2018).

Two other competency aspects, namely knowledge and skills competencies, are formulated in the form of Core Knowledge Competencies (KI-3) and Skills (KI-4) as well as elaboration of Basic Competencies at each Core Competence. KI-3 is formulated by understanding, applying, analyzing, and evaluating basic factual, conceptual, operational, and metacognitive knowledge in accordance with the field and scope of work from the Basics of Computer and Informatics Engineering at the technical, specific, detailed, and complex level, relating to science, technology, art, culture and humanities in the context of developing self-potential as part of family, school, and the world of work, nationally, regionally and internationally (Izmirli & Kurt, 2009; Wilson, 2002). KI-4 is formulated through:

a. Carry out specific tasks, using tools, information, and work procedures that are commonly carried out and solve simple problems in accordance with the fields and scope of work Basics of Computer Engineering and Informatics.
b. Showing independent performance with measurable quality and quantity in accordance with work competency standards.
c. Demonstrate skills of reasoning, processing, and presenting effectively, creatively, productively, critically, independently, collaboratively, communicatively, and solutions in the abstract domain related to the self-development of what he has learned in school, and being able to carry out specific tasks under direct supervision.
d. Demonstrate skills of perception, readiness, imitation, familiarize proficient motion, make natural motion, up to original actions in the concrete realm related to the self-development of what he learned in school, and be able to carry out specific tasks under direct supervision.

KI-3 and KI-4 are achieved through direct learning by elaborating with several Basic Competencies. For example in basic competencies at the knowledge taxonomy level that analyzes the problem (C4) of the Computer and the Basic Network Subject. The skill taxonomy level is to do and manage (P4). Examples of basic competencies are analyzing problems and do improvements to the hardware and installation of application software. Based on observations, the learning process has not been able to provide a real picture of the problems that often occur on computers, especially on hardware.

2. Literature Review

2.1 Aplication Software

Application software is software that helps do several tasks that are immediately useful or fun. Examples are games, software for automatic cash machines (ATM), control software in aircraft, e-mail software, word processing, spreadsheets (Guindon, 1990). Application Software created by a computer programmer. So that it can be defined application software is software that is used by users to do certain jobs or applications such as typing, drawing, counting, listening to music etc (Borchers, 2008).

2.2 Artificial Inteligence

Intelligence has meaning in language and terms. According to language. This word comes from Latin intellgence intelligo which means 'I understand'. So the basis of intelligence is the ability to understand and act (Korb & Nicholson, 2010; Jing et al. 2018). By using this simple definition of intelligence (making the right decision), we can apply this not only to humans, but also to animals that show rational behavior. But the intelligence exhibited by humans is far more complex than animals. So that it can be defined artificial intelligence is a process in which mechanical equipment can implement events using intelligence or thinking like humans (Nilsson, 2014; Russell & Norvig, 2002).

2.3 The Application of Artificial intelligence

Artificial intelligence software-makes use of nonnumerical algorithms to solve complex problems that are not amenable to computation or straightforward analysis.

2.4 TIK.OP02.017.01

TIK.OP02.017.01 is a work competency standard of the Computer Operator sub-sector with the title "Performing Troubleshooting on Problems on a PC". This competency unit deals with identifying the workings of a computer (PC) and handling it if the computer cannot work. This is in accordance with basic competencies analyzing problems and making improvements to the hardware and installation of application software. So that this competency unit will be used as a reference in the design and development of artificial intelligence applications to troubleshoot computers as learning aids (Bahler et al. 1994; Barr et al. 1993; Zurita & Nussbaum, 2004). The purpose of this study is to design and develop learning aids through the application of artificial intelligence in computer troubleshooting. Learning tools are used in the learning process of computers and basic networks with computer problem solving teaching materials. So that learning aids through the application of artificial intelligence can improve student learning outcomes.

3. Methodology

The research method used in this study is R & D (Research and Development). Research and Development is a research method used to produce certain products and test the effectiveness of this product (Desai & Potter, 2006; Sugiyono, 2010). The steps of research and development can be defined as scientific ways to conduct research, design, produce and test the validity of products that have been produced. There are four basic steps are research, design, production and testing product validity (Tarsito, 2014). The four steps above will be used as an approach to the model to be used, namely 4-D. 4-D. Model is a model developed by Thiagarajan & Semmel, (1974), this model consists of a stage of development i.e., Define, Design, Develop and Desseminate.

4. Discussion

The stages in designing and developing the application of artificial intelligence to computer troubleshooting as a learning aid consist of four stages. The stages are Define, Design, Develop and Disseminate. The define phase consists of front end analysis, student analysis and task analysis. The design stage consists of developing benchmark reference tests and selecting learning media. The stages of develop consist of validation of tools by experts followed by revisions, limited simulations and trials with actual students. The disseminate stage is carried out with the dissemination and use on a wider scale.

4.1 Define

The front end analysis is done by looking at the analysis of the needs of the product. This consists of curriculum analysis, function analysis and hardware and software analysis. Curriculum analysis shows that the taxonomy of basic competencies is in accordance with the competence of Computer Technical Support (CTS), especially the competency unit TIK.OP02.017.01. The analysis of the function of this product is not only students as end-users but also for other teachers and developers. Hardware analysis of this product is client server and software with three levels, namely admin, expert and user.

Needs analysis is supported by a needs analysis of learning Computer and Network Engineering and computer troubleshooting learning. The results of the learning needs of Computer and Network Engineering with sufficient categories are needed. The results of the need for computer troubleshooting learning in a category are urgently needed. So that the final result of the analysis of the needs of artificial intelligence applications troubleshoot computers in a very necessary category.

Table.1: Analysis of Student Nedds

Learning Needs Analysis	Calculation of Coefficient Intervals			Category
	Maximum score	*Score of acquisition*	*Coefficient Interval*	
Computer and Network Engineering	577	792	0.729	Enough needed
Computer Troubleshooting	2051	2475	0.829	Very needed
Artificial Intelligence Application Computer Troubleshooting	2668	3267	0.804	Very needed

4.2 Design

The design stage is done in two steps, namely the development of the benchmark reference test and the selection of learning media. The development of a benchmark reference test is taken with an assessment of performance based on TIK. OP02.017.01. This competency unit is entitled to do troubleshooting on a PC problem. The selection of learning media is designed with web-based applications in accordance with the results at the define stage. The design process has three stages, namely designing the application, collecting materials, and making. Application design stages by making prototypes from the application. Stages of data collection by searching for materials and tools needed in application development. The manufacturing phase is done until the application can be entered into web hosting.

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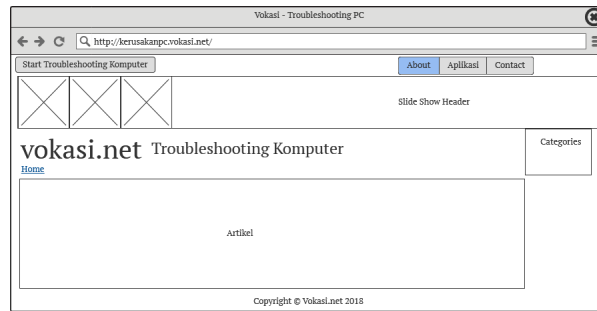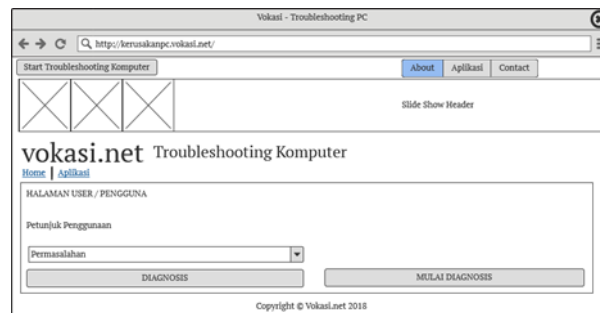

Figure.1. Prototype Home

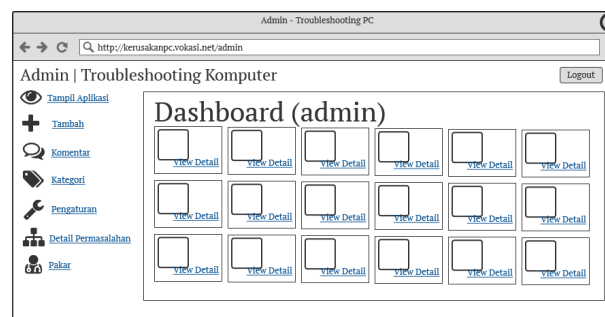**Figure. 2. Prototype and Application**

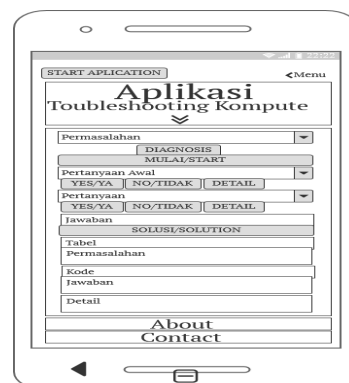**Figure. 3. Prototype Dashboard Admin**

Figure. 4. Prototype an application on a Smartphone

The designed application is entered into web hosting and creates on the sub domain. This application can be accessed with the Uniform Resource Locator (URL) that is kerusakanpc.vokasi.net. Especially for mobile users, they can access kerusakanpcand.vokasi.net. Example of a screenshot of the application after going through the revision process at the design stage.
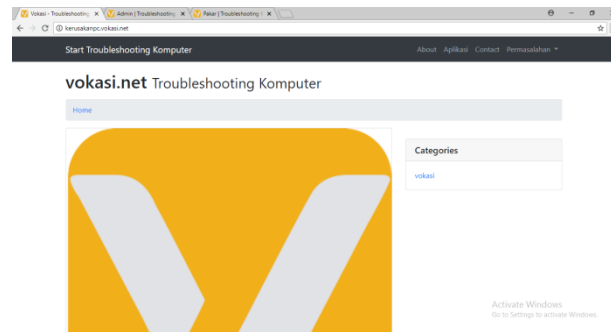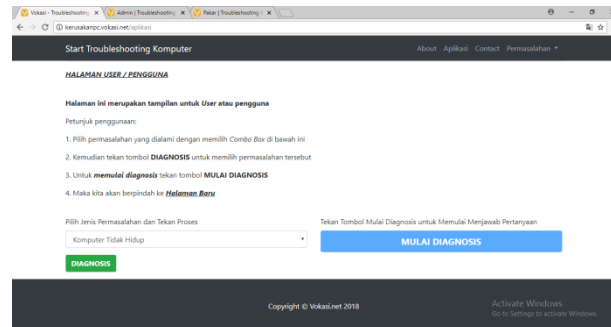
Figure. 5. Home

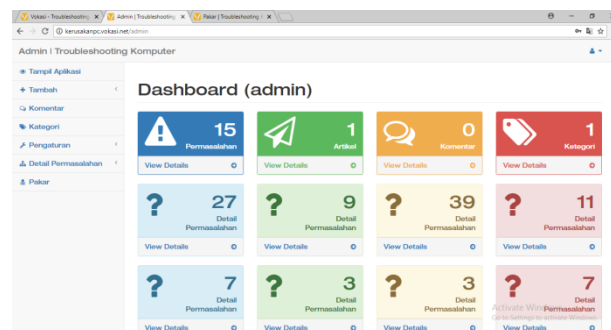**Figure. 6. Application**

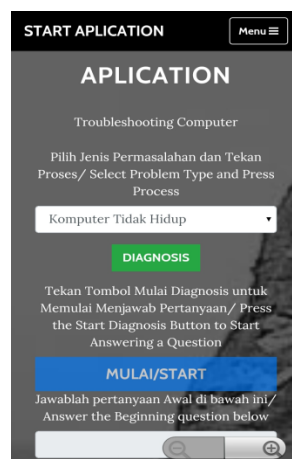**Figure. 7. Dashboard Admin**

Figure. 8. Application on a Smartphone

4.3 Develop

The stages of develop consist of three steps: validation of tools by experts followed by revisions (validity), simulations (practicalities) and limited trials with actual students (effectiveness). Validity is tested by

Information Technology and material experts. Practicality is measured by instruments from A.M Lund USE Questionnare. Effectiveness is tested by the gain's score.

Testing the validity was tested using Aiken's V statistics. The value of Aiken's V was interpreted with guidelines for the interpretation of Uncorected Corelation Coefficient. The results show that each item is very useful. So it can be concluded that the application of artificial intelligence to computer troubleshooting is valid.

Table. 2: Recapitulation of Results of Validity

Field Specialist	Calculation of Content Validity Coefficient			Category
	Number of Experts	Number of Question Items	Coefficient Interval	
Information Technology	3	20	0.821	Very useful
Material	3	5	0.850	Very useful

Practical testing was measured by the USE Questionnaire instrument from A. M Lund. This instrument consists of Usability, Ease of Use, Ease of Learning and Satisfaction. The results of the four categorical indicators are very practical. So it can be concluded that the application of artificial intelligence computer troubleshooting is practical.

Table. 3: Recapitulation of Results of Practical

Use Scale	Calculation of USE Questionnaire			Category
	Mean	Number of Question Items	Coefficient Practical	
Usability	4.021	8	0.825	Very practical
Ease of Use	3.879	11	0.776	Practical enough
Ease of Learning	3.917	4	0.783	Practical enough
Satisfaction	4.100	7	0.820	Very practical
Practical	3.973	30	0.800	Very practical

Effectiveness testing with gain score. Gain score was calculated by reducing the results of the posttest group with the pretest. Then 100 minus the results of the pretest group. Finally, the results of the first process with the second process are divided so that the g value (gain score) is obtained in each comparison group. The results are then taken the max gain score and the min gain score for the average. The result is a gain score of 0.32 with the medium category. So it can be concluded that the application of artificial intelligence computer troubleshooting is effective.

4.4 Disseminate

This stage is the spread and use of computer intelligence artificial intelligence applications that have been developed on a wider scale. The development of this application conducts online dissemination through web hosting with the California Resources Locator http://www.keruasakanpc.vokasi.net and http: //www.ker Damage pcand.vokasi.net for mobile web browsers. So that the application of artificial intelligence computer troubleshooting can be used by anyone and anywhere.

5. Conclusion and Recommendation

5.1 Conclusion

The application of artificial intelligence as a learning aid has been successfully developed. This is in accordance with the analysis of the needs obtained. The results of the needs analysis are a reference in the design of the application. Design results are hosted on web hosting services. So the application can be tested for the validity, practicality, effectiveness and deployment of applications through online.

5.2 Recommendation

This research has succeeded in designing an application to solve problems in basic computer learning for students. However, this application needs to be developed further to improve it on various other aspects, such as website appearance, features and content. Subsequent researchers have wide space opportunities to be able to develop designs and designs that are even better, so that the application is effective and can be easily used by students.

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