

The use of Certainty Factor (CF) in Technostress Diagnosing Expert System

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Abstract:- Technological advances have a positive and negative impact, a person's inability to keep abreast of computer technology can lead to technostress. The term stress is often used to designate a dynamic condition, in which a person is confronted with an opportunity, obstacle, or demand that is associated with what he really wants and the results are perceived as uncertain and important. To help lecturers and students at AMIK Indonesia who suffer from technostress problems, computerized based tools are needed in the form of Expert Systems designed in a computer program to determine the value of these uncertainties and have abilities such as a doctor. This expert system uses the PHP and MySQL progress language as the basis for the web-based Certainty Factor (CF) method by consulting can answer each question with yes or no, in order to find out information about the symptoms and problems of existing technostress and the solution to therapy for these symptoms. Based on the research and system design carried out, it can be concluded that the method of Certainty Factor (CF) can be applied in expert systems to diagnose web-based technostress.

Keywords:- Certainty Factor (CF), Technostress, Expert System.

I. INTRODUCTION

Currently, the application of information technology has been widely used in the world of education both by using applications and on learning [1,2]. Many educational institutions at universities use computers as one of the learning tools [2]. However, the use of applications for learning purposes [3,4,5], this does not always have a positive impact, but can also have a negative impact such as the symptoms of technostress for its users [7,8].

The term stress is often used to designate a dynamic condition, in which a person is confronted with an opportunity, obstacle, or demand that is associated with what he really wants and the results are perceived as uncertain and important. The term stress is a neutral term, meaning stress does not have to have a negative value, stress also has a positive value [8]. Technostress is excessive use of technology and will have an impact on the occurrence of stress on activities so that it will create a decrease in overall performance [9,10,11,12]. In addition, technostress can significantly affect the intention of teachers and students to use technology, technostress also mediates the emergence of stress on educational institutions and the intention to use technology [13]. It has been proven that technostress affects learning satisfaction and

achievement at the student level [14,15]. However, the impression of the technicians who provide additional stress to students majoring in computers has never been done in-depth research.

In this study, the authors created an expert system using Certainty Factor (CF). Certainty Factor (CF) can be said as an inference strategy that starts from a number of facts that are not yet known. Search is done by using rules whose premise matches the known facts to obtain new facts and continue the process until the goal is reached or until there are no more rules whose premises match the known facts and facts obtained. This study also developed an expert system to discern discontinuous computer use intentions, namely behavioral intentions in the termination phase, in the context of software engineering lessons, where AMIK Indonesia uses the curriculum with more practice than material learning and this shows a very important role. This study tries to avoid stress and develop alternatives to discontinuous use intentions, which researchers identified as behavioral responses to learning practical subjects in the Indonesian AMIK computer laboratory.

With this problem, an analysis will be carried out to find out what factors and impacts will arise from the symptoms of technostress from computer users in practical learning at AMIK Indonesia. In this analysis will use the Certainty Factor (CF) method. The expected results of this study are to be able to find out the factors that can lead to technostress and what effects caused by technostress for students and lecturers.

II. RELATED WORK

Several previous studies on diagnosing stress levels of learning in students have been successfully carried out to analyze the level of stress learning in upper-level students [16]. Stress also has an impact on students who will be afraid of learning, because they have been wrong in answering questions and feeling humbled by the teacher so they feel afraid of learning. [17]. Expert systems for measuring stress levels in students with the forward chaining method produce that the stress level of learning in students is the main factor, students are exhausted, and emotions are unstable .aintaining the Integrity of the Specifications.

Mada (2017) also mentioned that stress can affect children who can cause tension and disrupt the stability of daily life, stress levels can also be measured using Certainty Factor and valid and feasible to use [18]. Taufiq

and Natarsyah (2016) also stated that with the existence of an expert system using certainty factor (CF), it can do reasoning as an expert even though it is in a condition of data uncertainty, and to obtain a belief value, in this case, the belief value of a disease is suffered. Certainty factor is a clinical parameter to show the amount of trust. This application can help the community to diagnose mental disorders [19].

From the results of the above research, it can be concluded that the stress level of learning in students is due to factors of friends, environment, and family that make students stress in learning. Stress that occurs can be either positive or negative stress, where stress will have its own impact on those who experience stress. Basically, stress occurs because of the overload of the mind, and the pressure that makes it lack concentration. The use of certainty factor (CF) is also feasible and appropriate for the Technostress case in a college education institution.

III. BACKGROUND THEORY

A. Stressor

Some studies related to technostress have formulated several quite complex stressors, namely: over workload, ambiguity challenges, breaking down privacy, homework clash, job insecurity, techno-uncertainty, and techno-complexity. [20,21]. However, the research is aimed at users in private sector organizations who work with high intensity of IT usage, assuming that users have high IT capabilities as well. While in the context of public sector organizations, especially schools, the model cannot be fully adopted. This study only uses work overload and job insecurity as stressors. Based on the researchers' observations, in the teaching assignment, the intensity of the use of IT has not arrived at the task that is in direct contact with the boss or stakeholders. Instructions for tasks from superiors or stakeholders are still by direct instruction by superiors or circulars (without computers, social media, or communication using gadgets). So, based on the parsimony concept and face validity, the principle ambiguity challenges, breaking down privacy, homework clash, job insecurity, techno-uncertainty, and techno-complexity are concluded to have no testing power in the context of lecturers in Indonesia.

B. Work Overload

The workload is the amount of work that have to be carried by a position / organization unit and it is the product of work volume and norm of time [22]. The workload is part of the capacity of workers given that should be finished [23]. In this case, capacity is the ability (ability, ability) possessed to solve the problem so that the ability can function and produce proportionally according to the tasks and functions that are owned [23]. Workloads or work tasks can be a source of stress, for example in jobs that require working quickly, producing something and concentrating excessively [24]. Meanwhile, Hart and Warren (2015) say that over work is a match between the capability or capacity of mental processes / individual thinking with a number of tasks. They also stated that the response of the large or small workload is not always because of the large workload, but it can be categorized

based on the capabilities and mental capacities of individuals in carrying out their duties [25].

The capabilities and capacities of individual mentors here can be summarized in cognitive terminology. In the technology acceptance model (TAM), Davis's model hypothesizes the general intention to use IT based on cognitive probability of how this will improve their performance [26]. So that perceptions of usefulness and ease of use are nothing but proxies of individual cognitive possibilities [27]. Thus, referring to Hart and Warren [25] and TAM [28,29] individual cognitive weakness will form a weak perception of the usefulness and ease of use of an IT. The failure to meet these perceptions of usefulness and convenience on the burden of a heavy accounting teacher's workload will lead to a perception of excess workload. The perception of the overload of work on contrast is felt because some teacher work in the present era depends on computer use.

C. Technostress

Technostress is a negative effect on human attitudes, ways of thinking, acting, and psychology that is produced directly or indirectly through the use of computer-based IT [30]. The limit of human cognitive abilities and the ability to slow down the development of technology slow the increase in effectiveness in the effectiveness of IT use and individual productivity [31].

Stress is a cognitive problem experienced by individuals in the recovery of the environment that exceeds one's capabilities and resources to deal with it, where each individual expects the substance of rewards and sacrifices that are different from the conditions obtained [10,12]. The term techno stress was founded in 1984 from clinical psychology called Craig Brod. Brod says that it is as a modern disease caused by the inability to master or cooperate with IT in healthy ways [32]. Technostress reviews the stress experienced by users as a result of multi-task applications, continuous connectivity, information overload, changes (enhancements) associated with the use of IT in organizations [9,11].

Stress in the workplace that considers the contribution and effect on health problems and quality of life [32]. The World Health Organization (WHO) determines that work flows is change because of the increased use of IT [33]. Those who claim as an organization responsible for preventing and eliminating health risks in the workplace, namely at physical risk and most are psychological problems that improve health. WHO also states that training personnel and adjusting equipment are prepared to reduce workers' health risks [32].

Some studies have proven that the impact of technostress changes in individual behavior [9,11]. Studies find somebody who improve techno stress have low productivity, job satisfaction, and decreased commitment to the organization. Meanwhile, this studi focuses on the antecedents of better technostress. The direct antecedents of technostress are their own stressors.

In addition, as explained at the beginning, this study discusses stressors in two constructs, namely workload

overload and work insecurity. Previous study found that a link between job insecurity and perceptions of technology [33,34]. The study of resistance to technological change opposes the fear of losing a job as a source of resistance. Individual concerns are often related to challenges being unused, or requirements to learn new, higher skills. Permanent changes in IT and the wide number of available worker choices make individual resources likely to be unused. Furthermore, because cognitive resources are limited, individuals often feel excluded from the latest developments.

D. Certainty Factor

The Certainty Factor method is very suitable to be used to measure the level of certainty of disease based on the value of hypothesis and evidence [35] and can be used in the field of psychology to identify the personality of students [36,37]. The certainty factor was introduced by Shortliffe Buchanan in making [38]. Certainty factor (CF) is a clinical parameter value given by MYCIN to show the amount of trust. In dealing with a problem often found answers that do not have full certainty. This uncertainty can be a probability or probability that depends on the outcome of an event [39]. Uncertain results are caused by two factors: uncertain rules and uncertain user answers to questions raised by the system. This is very easy to see in the disease diagnosis system, where experts cannot define the relationship between symptoms and their causes for sure, and patients cannot feel a symptom as well. In the end, there were many possible diagnoses [39].

Certainty factor is defined as the following equation: $CF(H, E) = MB(H, E) - MD(H, E)$ $CF(H, E)$: Certainty factor of hypothesis H which is influenced by symptoms (E.) ranging from -1 to 1. Value -1 shows absolute distrust while value 1 shows absolute confidence $MB(H, E)$: measure of increased belief in the hypothesis H which is affected by symptoms of E. $MD(H, E)$: measure of increased disbelief to hypothesis H which is affected by symptoms E. The basic form of the Certainty factor formula, is a rule if E then H as shown by the following equation: $CF(H, e) = CF(E, e) * CF(H, E)$ Where: $CF(H, E)$: Certainty factor hypothesis that is influenced by evidence e. $CF(E, e)$: Certainty factor evidence E which is affected by evidence e. $CF(H, E)$: Certainty factor hypothesis with evidence assumption is known with certainty, that is when $CF(E, e) = 1$. If Evidence on antecedent is known with certainty then the equation will be $CF(E, e) = CF(H, E)$. CF values (rules) are obtained from the interpretation of "terms" from experts, which are converted into certain CF values according to the following table.:

<i>Certainty factor value</i>	<i>CF</i>
Definitely not	-1.0
Almost Sure No	-0.8
Most likely no	-0.6
Probably not	-0.4
Do not know	-0.2 to 0.2
Maybe	0.4
Most likely	0.6
Almost certain	0.8
Certainly	1.0

Table 1:- Certainty Factor Value

IV. METHODOLOGY

This research was conducted at AMIK Indonesia Banda Aceh. The population in this study were all productive lecturers and students at the College. The research method stage is carried out as shown in Figure 1 below.

1. Scope The scope of scope is to determine the boundaries of the problem under study. The identification of the scope aims to maintain the consistency of this research is more directed, so that the objectives of the research expected are achieved.
2. Analysis of the problem After knowing the scope then the next thing that is done is analyzing the problem where after determining the problem or variable that will be examined, it is necessary to analyze the variable whether it is feasible to do research on the problem.
3. Determining the Research Objectives The researcher determines the purpose of the research is to find out how the expert system for technostress problems uses web-based Certainty Factor (CF) methods.
4. Studying Literature To support the course of the research, researchers study sources of knowledge in the form of theoretical books, research journals, and other authentic library resources related to research, including artificial brilliance, expert systems, PHP, MySQL, and UML.
5. Data collection is carried out in order to obtain details about the variables taken to be examined in order to complete the information gathered, and in this study data collection, techniques use interviews as a tool to obtain the data needed.
6. System Analysis enters system design the writer must analyze the system first to find out weaknesses, strengths, and opportunities and improve them.
7. System Design System design is part of designing a web of expert systems that use the Certainty Factor (CF) method in order to determine technostress problems.

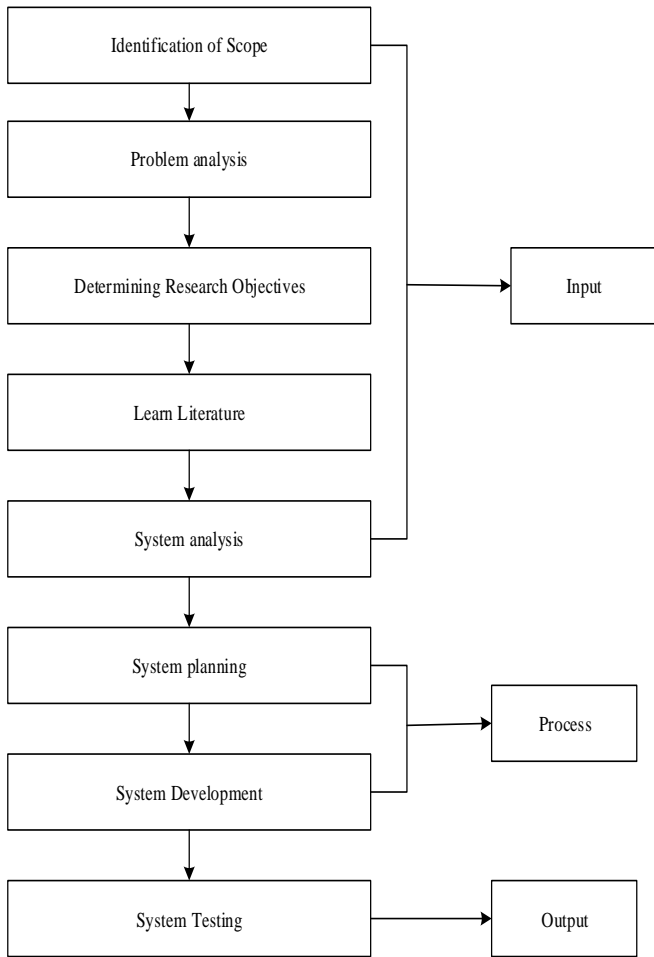


Fig 1:- Research Framework

V. IMPLEMENTATION

The results of this study are expert systems for dramatic personality problems using the web-based Certainty Factor (CF) method. The application is implemented using the PHP Native programming language and by using MySQL as the database. On the results of the expert system application design then produce several forms such as; public page, consultation page, login page, alternative, criteria, knowledge and analysis results.

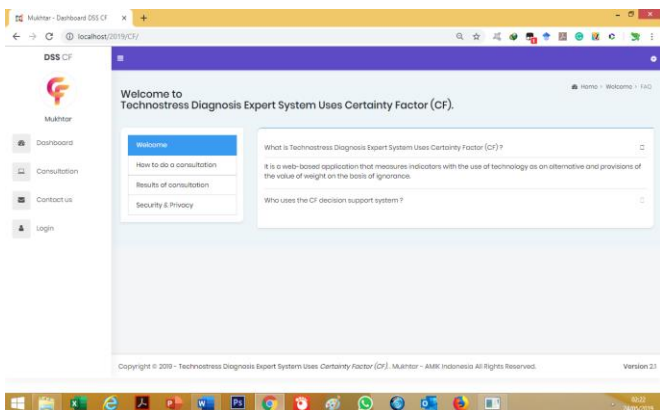


Fig 2:- Public page

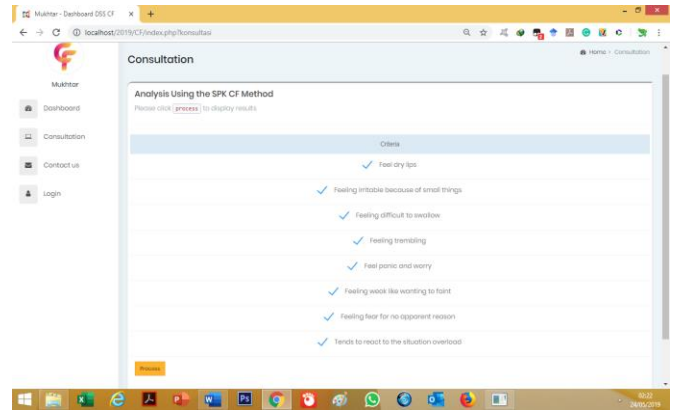


Fig 3:- Consultation page

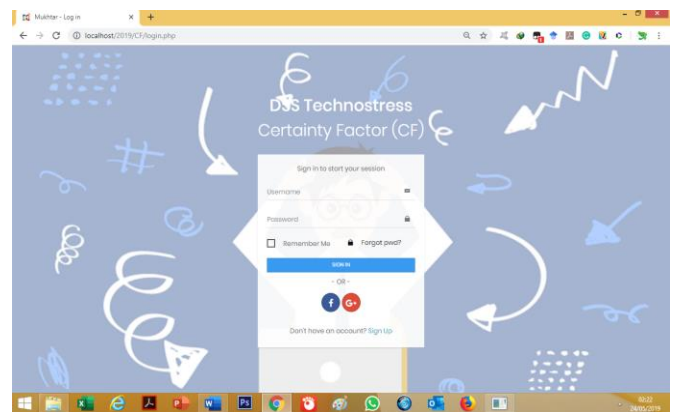


Fig 4:- Login Page

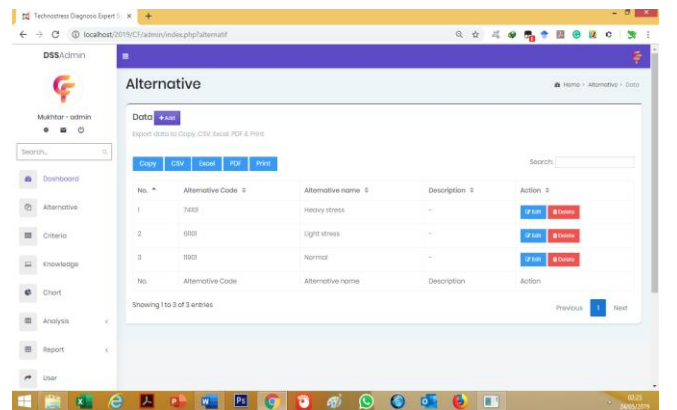


Fig 5:- Alternative page

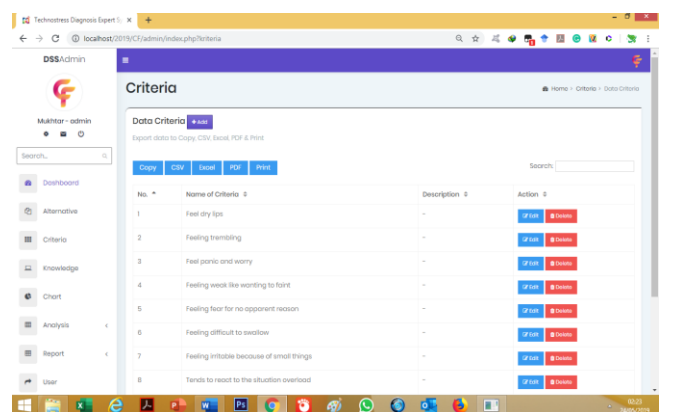


Fig 6:- Criteria page

No.	Alternative name	Criteria Name	MB	MD	Action
1	Normal		0.1	0.8	[Add] [Delete]
2	Normal	Feel dry lips	0.8	0.1	[Add] [Delete]
3	Normal	Feeling weak like wanting to faint	0.8	0.2	[Add] [Delete]
4	Normal	Feeling fear for no apparent reason	0.7	0.1	[Add] [Delete]
5		Feel dry lips	0.8	0.2	[Add] [Delete]
6		Feeling irritable because of small things	0.7	0.2	[Add] [Delete]
7		Feeling difficult to swallow	0.8	0.2	[Add] [Delete]
8		Feeling trembling	0.8	0.1	[Add] [Delete]

Fig 7:- Knowledge page

Selected criteria: **Feel dry lips, Feeling trembling, Fear for no apparent reason, Feeling fear for no apparent reason, Feeling difficult to swallow, Feeling irritable because of small things, Feels to react to the situation overload**

Alternative list: **CF**

Normal	0.75
Light stress	0.408
	0.39208
Heavy stress	0.1

Possible Biggest stress (Alternative): **Normal**

CF: 0.75

Fig 8:- Analysis Results Page

VI. CONCLUSIONS

Based on the research and system design carried out, conclusions can be drawn, namely:

1. The method of Certainty Factor (CF) can be applied in expert systems to diagnose web-based technostress.
2. The admin system can process adding, deleting and changing data for technostress problems.
3. This expert system built facilitates lecturers and students as well as the general public to know the symptoms of technostress problems.

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