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The Development of TOEFL ITP Learning Determination Application Using Forward Chaining Method

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expert system, forward chaining, TOEFL ITP

ABSTRACT
Adequate English language competency is very necessary in today's modern era so as not to discuss difficulties in global communication and interaction. The average English language skills of students or generations aged 18-20 years in Indonesia show low results. To solve this problem, efforts are needed to increase English language competency through appropriate learning activities. The system development method for this application uses the waterfall method. The use of the forward channeling method in an expert system will help determine appropriate and effective ways of teaching and learning English to students. The aim of this research is to apply an expert system to obtain recommendations for effective English learning based on TOEFL ITP scores. Three aspects of TOEFL ITP, namely listening, reading and structure, will be used in the analysis process using forward chaining. The forward chaining method carries out processing starting from the data set and then performs inference according to the rules used until the optimal inference is found. The inference engine will continue to go through the process to arrive at the right decision result. The expert system application is designed to be website-based so that it makes it easier for users to use it at any time.

INTRODUCTION

In the current era of globalization, English proficiency plays a very important role in global communication and interaction. According to statistics released by w3techs (World Wide Web Technology Survey) as of January 2014, more than 50% of the information on this planet has been computerized and uses the international language, namely English (Anonymous, 2014). According to a study by (Deygers, 2021), TOEFL scores are often used by universities to assess not just language proficiency but also the ability of international students to succeed in an academic environment where English is the medium of instruction. Research conducted by (Ginther & Yan, 2018) highlights that TOEFL iBT Speaking scores can effectively predict academic success in English-speaking universities, particularly in oral communication tasks such as presentations and discussions. In fact, the average English language skills of students in Indonesia or the generation aged 18-20 are low (Kompas, 2022). To overcome this problem, one needs to work on improving English skills through appropriate learning activities. The difficulty of finding suitable learning activities is another problem in improving English language skills in Indonesia. To overcome this problem, a

support system is needed that utilizes the expertise of English language education experts to make it easier for English teachers to carry out effective and efficient learning activities.

An expert system is a computer program that applies concepts from artificial intelligence to help humans solve problems involving knowledge, heuristics, and decision making. Expert systems can capture and store valuable expert knowledge, so that we can solve problems that require expert expertise in place even when experts are not present. Expert systems can be used to determine English language proficiency because they store expert knowledge/expertise which is really needed to determine the level of English language proficiency.

This expert system was created using the forward chaining method, where the inference engine uses user-specified information to move through AND and OR logic until an object is identified. All rules must be met to achieve a goal. In an expert system created using the forward chain method, its inference engine uses user-defined information to move through AND and OR logic until an object is identified. All rules must be met to achieve a goal. This system is based on the Android system, and users can use it anytime, anywhere.

According to a study by (Cumming et al., 2005), the TOEFL iBT Reading section evaluates not only reading comprehension but also the ability to integrate information from multiple sources, which is crucial for academic success in higher education. A study by (Chapelle & Voss, 2008) emphasizes that TOEFL test scores are significantly correlated with students' performance in university-level writing courses, highlighting the test's role in predicting writing proficiency. In their research, (Weigle & Goodwin, 2016) found that TOEFL Listening scores are a strong predictor of students' ability to comprehend academic lectures and participate effectively in classroom discussions. As noted by (Taylor, 2012), the TOEFL test's Speaking section is designed to assess not only language fluency but also the ability to communicate effectively in an academic setting, which can impact students' overall performance in English-speaking institutions."

Based on the background of the problem above, so the author is interested in developing application of case study TOEFL ITP with the title " The Development Of TOEFL ITP Learning Determination Application Using Forward Chaining Method".

Literature Review

Expert System

An expert system is a computer information system that utilizes expert knowledge to achieve advanced decision-making performance in a narrow problem domain (Turban et al., 2005). An expert system has several main components, namely a user interface, an expert system database, and a reasoning mechanism. Apart from that, there are components that only exist in some expert systems, namely interpretation tools (Kusrini, 2006). There are 2 main components in expert systems, namely development and consultation (Arhami, 2005).

Forward Chaining

According to the Forward Chaining method, it is a method used to solve management and forecasting problems (Giarratano & Riley, 1994). According to (Kusrini, 2006) knowledge in writing rules is represented in:

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IF [antecedent] THEN [consequent]
IF [condition] THEN [action]
IF [premis] THEN [conclut
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The rules in production rules are divided into first-level rules and meta rules. First-order rules are rules whose conclusions are not prerequisites for other rules. In contrast, a meta rule is a rule whose conclusion is a prerequisite for a rule contained in another rule.

TOEFL

TOEFL is an English test used to see the level of language fluency through listening, writing and structure, and reading tests. while the definition of Toefl According to (Sukur, 2013), TOEFL is a type of standard test to test English language skills as an absolute requirement for continuing education to a higher level at almost all universities in the world, including in Indonesia. In Indonesia, the use of TOEFL as an English language proficiency test is quite widespread, starting from simply knowing one's own strengths in mastering English to important needs such as taking part in educational programs and applying for jobs.

Application

In the beginning, before applications were first discovered in the world, all applications (programming) used Boolean algebra. Boolean algebra uses a binary code consisting of the number 1 and the number 0. Because using this binary digit code is too difficult, people make a group of bits consisting of nible (4bit), byte (8bit), word (2byte), and twofold (32bit). So then assembler code was created which later became the beginning of creating various types of applications which can now make human activities easier. An application is a program in the form of software and runs on a special system and is able to support various activities carried out by humans. (Juansyah, 2015).

Website

A website page is essentially a collection of hyperlinks which move to another address using HTML (Hypertext Markup Language). The inventor of the web was Sir Timothy John Berners-Lee, but the first web connected to a network appeared in 1991. According to another definition, a website is a collection of pages used to display text data, both static and moving. images, animation, sound or a combination thereof statically determines connected integration where each series is connected to a network page (Batubara, 2012).

The research gap in the context of TOEFL learning determination lies in the limited application of advanced expert systems, particularly those utilizing the forward chaining method, to provide personalized learning recommendations based on TOEFL ITP scores. Existing tools often lack the ability to offer dynamic, real-time feedback tailored to individual learner needs, leading to a generic evaluation process that does not adapt to specific user requirements. Moreover, there is a scarcity of mobile-friendly applications that allow for on-the-go assessment and improvement of English proficiency, further highlighting the need for innovative solutions in this area. Additionally, many current tools do not provide comprehensive feedback mechanisms that help users target specific areas for improvement, which is crucial for effective language learning.

This study introduces a new approach to determining TOEFL ITP learning outcomes by developing an expert system using the forward chaining method. Unlike traditional methods that may rely on static assessment tools or manual analysis, this expert system provides dynamic and automated support tailored to individual TOEFL ITP scores. The novelty lies in its integration of a forward chaining inference engine to analyze user input and provide personalized recommendations based on predefined rules. This method enhances the accuracy and efficiency of determining learning needs and proficiency levels. Additionally, the application is designed for mobile platforms, making it accessible anytime and anywhere, which addresses the need for flexible and on-the-go English language assessment tools.

RESEARCH METHOD

Research stages

Globally, the main stages of this research method are divided into four stages, namely, the preparation stage, the data collection stage, the data processing stage, and the data testing stage. The following is the flow of the research stages:

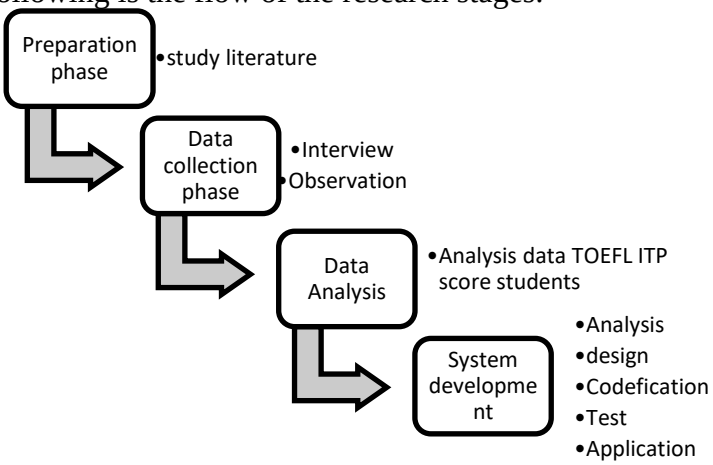

Figure 1. Research phase flow

From the picture of the flow of the research stages above, it can be described at each stage as follows:

Preparation Stage

This stage starts from assessing the problem, as well as conducting a literature study related to English learning and similar research that has been carried out.

Data Collection Stage

The data collection stages were carried out through an interview process and also observation. Interviews were conducted with lecturers in the English For Specific Purposes course. Observations were carried out by making surveys among students.

Data Analysis

In the data analysis stage the researcher used the observation stage for those taking the English For Specific Purpose course. By identifying problems with the object of research and looking at the needs that will be needed in the process of making rules using the forward chaining method.

System Development

For system development using the standard SDLC (Software Development Life Cycle) method, namely using the Waterfall method or Waterfall (see Figure 2).

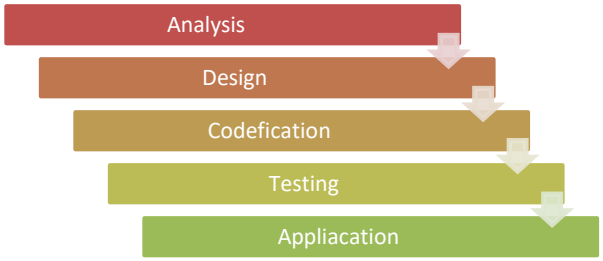

Figure 2. Waterfall Methodx

RESULTS AND DISCUSSION

In the system design using a use case diagram. Use case diagrams are used to describe a system in user view or system user. System design can be seen in the use case diagram below:

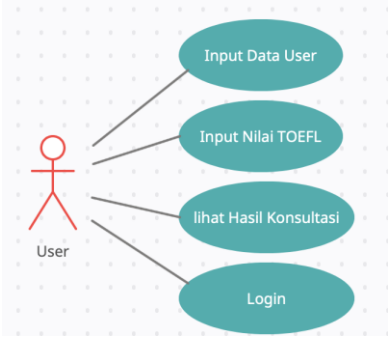

Figure 3. Usecase Diagram Application Of TOEFL ITP Learning Determination

Based on Figure 3 above, it can be seen that users, can log in, input user data, input TOEFL scores, view solution notes based on TOEFL scores.

From the ERD image below on figure 4, it can be seen that there are three entities, namely user, TOEFL variable value, and solution. The attributes of each entity include:

1. User: user_id, user_name, value
2. Solution: solution_id, description, solution
3. Value: value_id, value

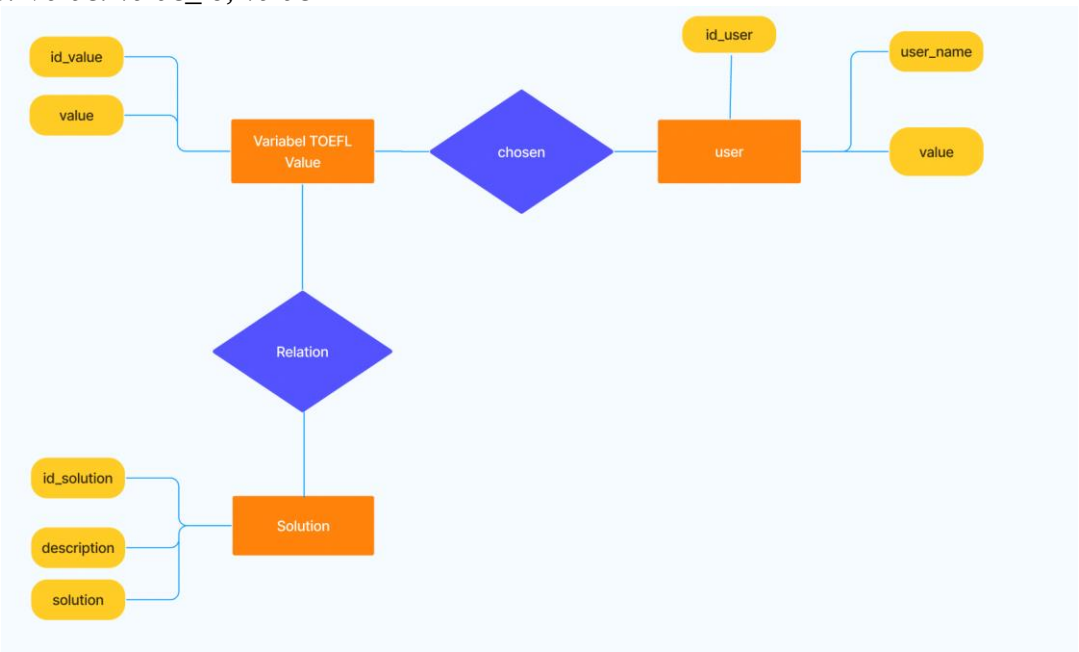

Figure 4. Entity Relationship Diagram Application Of TOEFL ITP Learning Determination

For the system application Of TOEFL ITP Learning Determination page display design, see Figures 5, 6, and 7 below:

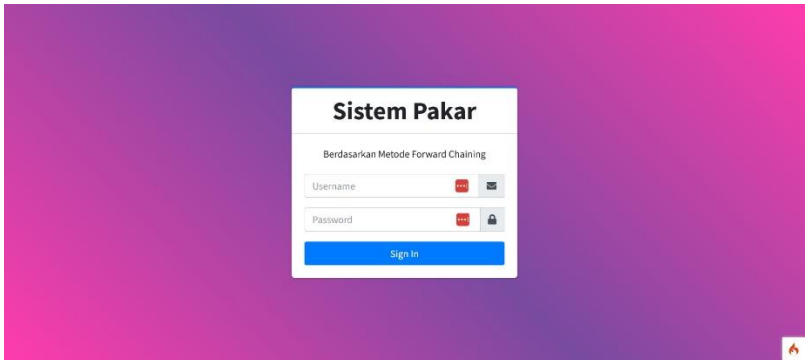

Figure 5. Home Page View

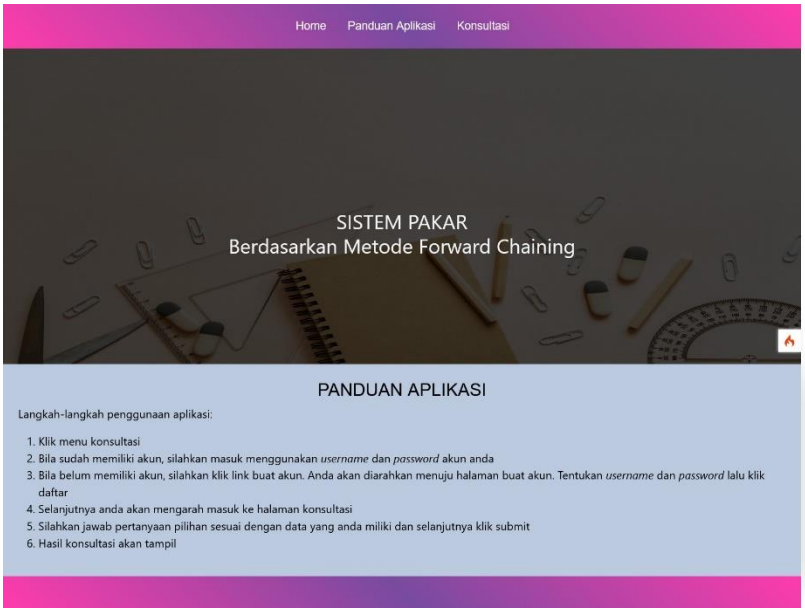

Figure 6. Application Guide View

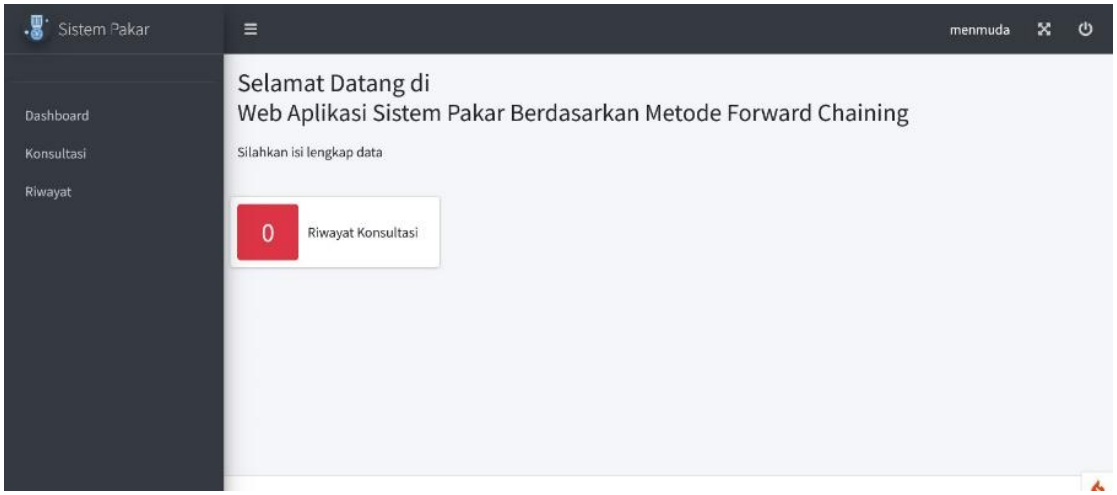

Figure 7. Digital Archive System login pages

CONCLUSION

The results of the reseach are : This TOEFL ITP learning determination application can provide a solution to the need for English language learning. Can make it easier for students to find out their level of English knowledge by inputting TOEFL ITP scores based on listening, reading and structure variables. Produce online expert system applications so that they can be used at any time and anywhere

REFERENCES

Anonymous. (2014). *Usage of Content Languages for Websites. diakses tanggal 10 Januari 2023.* http://w3techs.com/technologies/overview/ content_language/all

Arhami, M. (2005). Konsep dasar sistem pakar. *Yogyakarta: Andi*, *206*.

Batubara, F. A. (2012). Perancangan Website Pada PT. Ratu Enim Palembang. *Jurnal Ilmu Pengetahuan Dan Teknologi Terapan" Reintek"(Rekayasa Inovasi Teknologi)*, *7*(1).

Chapelle, C. A., & Voss, E. (2008). Utilizing technology in language assessment. *Encyclopedia of language and education*, *7*, 123–134.

Cumming, A., Kantor, R., Baba, K., Eouanzoui, K., Erdosy, U., & Jamse, M. (2005). Analysis of discourse features and verification of scoring levels for independent and integrated prototype written tasks for the new TOEFL®. *ETS Research Report Series*, *2005*(1), i–77.

Deygers, B. (2021). Standards in language proficiency measurement. In *The Routledge Handbook of Language Testing* (bll 578–596). Routledge.

Giarratano, J., & Riley, G. (1994). *CLIPS 6.0 user's guide*. Software.

Ginther, A., & Yan, X. (2018). Interpreting the relationships between TOEFL iBT scores and GPA: Language proficiency, policy, and profiles. *Language Testing*, *35*(2), 271–295.

Juansyah, A. (2015). Pembangunan aplikasi child tracker berbasis assisted–global positioning system (a-gps) dengan platform android. *Jurnal Ilmiah Komputer dan Informatika (KOMPUTA)*, *1*(1), 1–8.

Kompas. (2022). *Tanggal Akses 10 Maret 2023.* https://www.kompas.com/edu/read/2022/11/18/150428371/indonesia-posisi-ke-81-dari-111-negara-di-indeks-kecakapan-bahasa-inggris?page=all,

Kusrini, K. (2006). Sistem Pakar teori dan aplikasi. *Penerbit Andi Yogyakarta*.

Sukur, S. G. (2013). *Magic trick TOEFL ITP: magic trick menyelesaikan soal-soal TOEFL ITP ala sang pakar*. Yogyakarta: Kalarana Press.

Taylor, L. (2012). Accommodation in language testing. *The Cambridge guide to second language assessment*, 307–315.

Turban, E., Aronson, J. E., & Liang, T.-P. (2005). Decision Support Systems and Intellegent Systems–7th Ed (Sistem Pendukung Keputusan dan Sistem Cerdas). 2005. *Yogyakarta: Penerbit Andi*.

Weigle, S. C., & Goodwin, S. (2016). Applications of corpus linguistics in language assessment. *Banerjee and Tsagari*, 209–223.