



## Implementation of the Conversational Hybrid Design Model to Improve Usability in the FAQ

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### Abstract

FAQ is an important part of a system because it is used to make it easier for users to solve problems faced by users. Some FAQ systems have even started using Chatbot technology to make it easier for users. Chatbots have been widely used as a medium for services in almost all fields. Starting from marketing, service systems, education, health, culture and entertainment. Various types of chatbots have sprung up, ranging from text-based like short messaging applications to voice-based ones. However, not all forms of chatbot designs have been successfully implemented in the FAQ system. Adjustments need to be made, especially considering the persona of the user. This research provides a solution by implementing a hybrid conversational design. Hybrid conversation design is accomplished by incorporating text, voice, and buttons into the chatbot interface. Conversation activities with this hybrid interface provide keywords that users may search for in the form of buttons. The hybrid design of the FAQ Chatbot is proven to be able to improve user usability compared to full text chatbots and full text FAQs. The increase in user usability is measured using UEQ, the results of which show an increase in usability from all existing aspects. However, the implementation of this hybrid design also has the consequence that the conversation management system must have structured initial information.

Keywords: chatbot, hybrid conversational, usability, FAQ, UEQ

### 1. Introduction

Chatbots have become quite a popular technology lately. Several fields have implemented chatbots, especially as customer service. The chatbot is functioned as the first information-giving medium before the user/customer interacts further with the information system. Various fields such as entertainment, education[1], e-commerce[2], health[3][4] use chatbots as the vanguard of providing information and serving customers. Chatbot is an embodiment of the Intelligent Human Computer Interaction field[5]. Chatbot applies the concept of an easier interaction because it provides a user experience like using a short message application but can respond to the information needed by the user. In addition, chatbots are also a medium for gathering information[6], because chatbots not only provide information but also receive information in the form of commands like a conversation. The implementation of chatbots is indeed promising, because it can have implications for several aspects such as effective, fast and cost-effective services for public service departments. However, chatbots have not become the

main choice for users to be a place to "ask" and seek information.

One of chatbots application in the field of education is to increase the Frequently Asked Questions (FAQ) functionality. Chatbots can improve the functionality of university FAQs with better interaction[8][9]. In addition to having a website that is a source of information, UAD also has a chatbot with the name Adisty. This system utilizes the Telegram short message application. Adisty uses the basic design of a short message application. Conversation design using text media with user interaction using the keyboard and the send button. Adisty users are approximately 17% of the total 30,000,000 UAD student body. This indicates that Adisty is still not able to become a media that gives satisfaction to students as an information agent.

The Adisty user satisfaction test in Figure 1 shows that the attractiveness, dependability and novelty scales are below the benchmark average. This means that Adisty is still less interactive and users feel they have no control over the interactions that occur in the system. Adisty users feel that the system is unpredictable because it provides information, responses and

feedback that are actually different from what was expected. Based on the results of the satisfaction test, it is necessary to make improvements in terms of UI/UX design to improve the user experience.

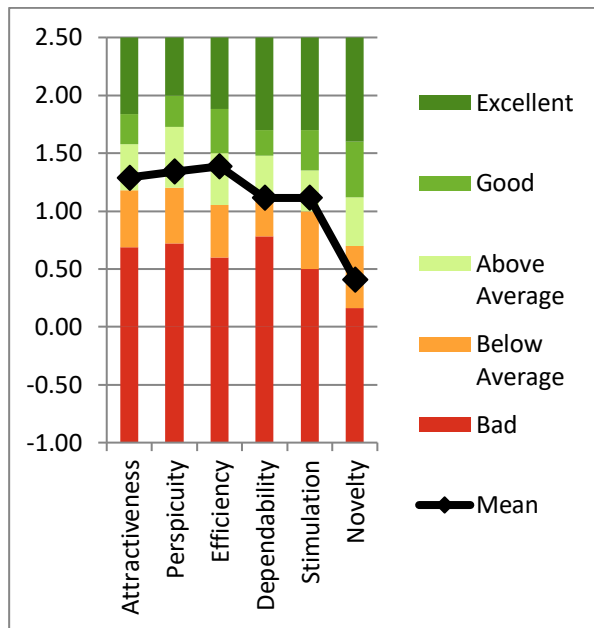


Figure 1. Adisty app UEQ benchmark results

The design of a chatbot must consider several factors, such as: dealing with conversation failures, natural conversation starters and closings, and getting to know users better [10]. There are three types of chatbot designs that can be considered, of course the human factor as a user must be prioritized[11]. The three types of chatbot designs are Menu/Button-based, Keyword Recognition-Based, and Contextual Chatbots[12]. Adisty is one example of the application of the Keyword Recognition-Based type. This type requires users to provide appropriate keywords to get the information they are looking for. In addition, the bot engine in charge of responding must apply good feedback[13]. Minimal feedback that should be there such as when the keyword is not recognized and when the interaction has ended.

Chatbots need to apply appropriate Artificial Intelligent (AI) algorithms and Natural Language Processing (NLP) techniques to increase interaction if the keywords entered do not match. This study will not discuss the application of AI and NLP, but will provide an alternative interaction using a conversational design model that more likely to increase user interaction. Based on the type of chatbot design, Contextual has the highest complexity, followed by Keyword-Recognition and finally Menu/Button as shown in Figure 2. Contextual design has the highest User Experience (UX) quality. Of course with adequate AI and NLP support.

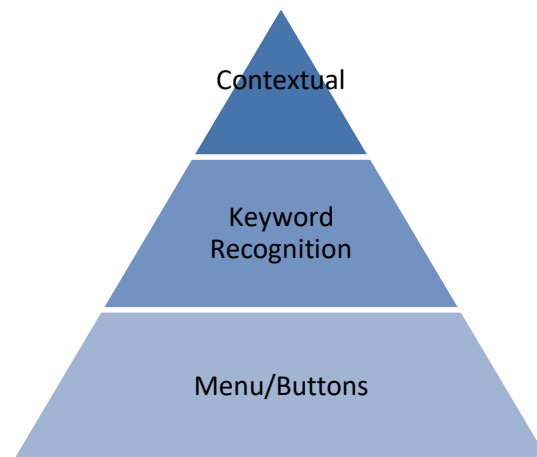


Figure 2. Rating of chatbot design on UX quality.

The most basic chatbot design is Menu/Button which implements a Button-based Conversational interface. While the Keyword-Recognition and Contextual designs emphasize the freedom of users to enter keywords. Based on these needs, Keyword-Recognition applies a Typing-based and Voice-based conversational interface. The implementation of this interface is only based on the requirement that the user must enter keywords only. But what if the user also doesn't know or is still confused about what keywords to enter?

The FAQ Chatbot has the main goal of making it easier for users to find important information in academic activities[14]. The ease of interaction presented is in accordance with the characteristics of the Chatbot FAQ users. The results of user analysis based on interaction data on the official website, social media accounts and Adisty bots can be concluded that more than 70% of users request visual instructions from the system.

Based on the results of this analysis, this study develops a chatbot product that applies a combination of 3 types of chatbot interface designs, namely typing-based, button-based and voice-based which is called the Hybrid Conversational interface design[15]. The goal is to provide convenience by providing instructions in the form of simple buttons to users. In addition, it also does not eliminate the ability of chatbots to recognize keywords provided by users.

This FAQ Chatbot with the Hybrid Conversational interface will be tested with its usability level by using the User Experience Questionnaire (UEQ) test scenario[16]. The results will be compared with Adisty as a chatbot agent with a typing-based interface. Testing is carried out in a limited environment by taking several user representatives.

## 2. Research Methods

The research stage adopts the Agile development model which consists of three repeatable stages starting from Requirements. The stages that can be repeated are

starting from the Design, Develop and Testing stages as shown in Figure 3. Iteration is needed to ensure the achievement of User Experience improvements as measured using the User Experience Questionnaire (UEQ). However, this research did not reach the Deployment stage.

The requirements stage is carried out by collecting data from the system and media used as a source of student information. Next is an analysis of what information needs need to be presented in the chatbot that will be built. This stage is important because the type of information will greatly affect the designed conversation model.

The design stage produces the architecture and the Hybrid Conversational design. Conversational model design applies interaction design principles to ensure UX targets are met.

The Development phase is for the implementation of the hybrid conversation model design that has been made using Dialogflow technology. Using Dialogflow speeds up the implementation process because it already provides a ready-to-use chatbot chat mechanism. Direct testing is done with UEQ to get results that are compared with UEQ Adisty.

The target of this research is to prove that the hybrid conversational interface applied to the FAQ chatbot has higher usability than Adisty which uses the typing-based conversational interface scenario

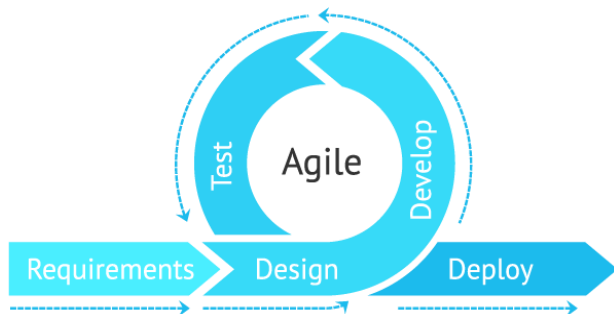


Figure 3. Agile method steps.

### 3. Results and Discussions

Based on the results of the UEQ test, Adisty Bot's conversational interactions need to be improved by making conversation designs easier.

#### 3.1. Requirements

Data collection is done by observing and analyzing transaction data from the FAQ business process. Some of the systems used for FAQ processing transactions are Telegram, Instagram, and Email bots. The data collected is in the form of question and answer data from question and answer activities. Observations and analyzes carried out resulted in groups of questions that often arise, namely problems regarding lectures

including: Payment of tuition fees, KRS, UTS, UAS, Practicum, and the academic calendar. As well as about student affairs include: Scholarships, Community Service Program, and TBQ

A group of questions used in a Chatbot FAQ conversation to trigger an informational response. The information used for the response was taken from the official website and UAD's official social media accounts. The grouping of questions aims to create a more directed conversation flow according to user needs. Users are still free to enter the desired keywords but are also given suggestions for the most popular question categories. Interaction requirements in the Chatbot FAQ require an interface design that allows to accommodate the required components and information.

#### 3.2. Design

Interface design refers to the user experience scale target to be improved. The targeted scale is attractiveness and dependability. The attractiveness scale is represented by 6 items which include annoying/enjoyable, bad/good, unlikable/pleasing, unpleasant/pleasant, unattractive/attractive, unfriendly/friendly. Interface design to meet the attractiveness scale applies design principles. The first is the use of Hick's Law to regulate the content that appears in the conversation application interface. The large amount of information needed in the chatbot interface is too messy and it is difficult to find the information. Related to Hick's law, the simple button principle uses only a shadow to show the button edge area. In addition, the interface design applies the Flat Design model because it gives the impression of being simple, easy and light when interacting [17].

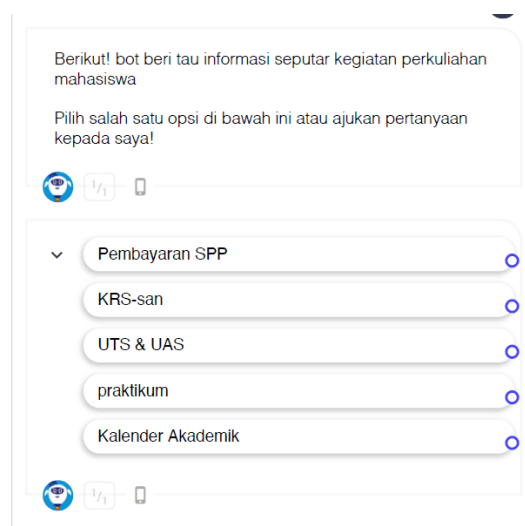


Figure 4. Welcome message display FAQ Chatbot

The flow of conversations in the Chatbot FAQ is created by providing an initial scenario that the user already knows his purpose, so it is assumed that the user will enter a keyword. However, to make writing easier, the system provides keyword suggestions for frequently asked questions. After that the conversation will flow according to the persona of each user.

### 3.3. Development

The process of constructing the Chatbot FAQ system uses Dialogflow as the engine to handle AI conversations. Figure 5 shows the dialogflow receiving input in the form of keywords that are matched to the intent. The keyword groups identified in the previous step are entered into Dialogflow as intents. An Agent is created in the dialogflow to recognize existing intents. The agent will match the intent with the training data of the given phrase. Furthermore, by using the parameters that have been determined as well, Dialogflow will send a response to the Chatbot FAQ application.

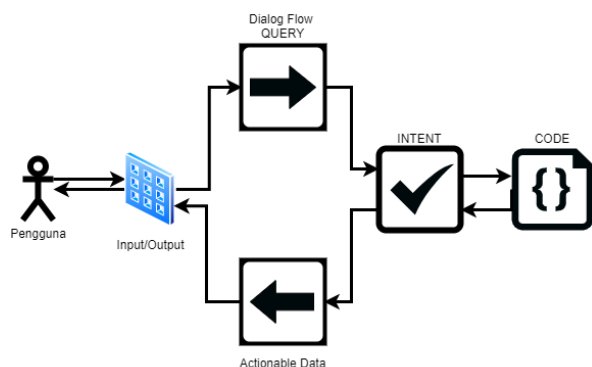


Figure 5. System architecture FAQ Chatbot

### 3.4. Testing

Testing is done using the User Experience Questionnaire (UEQ) which has 26 statements. UEQ statements are divided into 6 elements, namely: Attractiveness, Perspicuity, Efficiency, Dependability, Simulation, and Novelty. The test prioritizes the elements of Attractiveness, Perspicuity and Effectiveness, because they want to explore the quality of chatbot interactions with users.

The results of the UEQ test are compared with the benchmark shown in Figure 6. Only Novelty's value is still just above the benchmark average. The elements of Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation get good and above average scores.

The increase in the results of the three elements proves that Adisty's needs and shortcomings can be solved by applying the Hybrid Conversational design model. The considerable improvement in the Attractiveness element also shows that the hybrid model can make users more comfortable and satisfied when operating the FAQ chatbot.

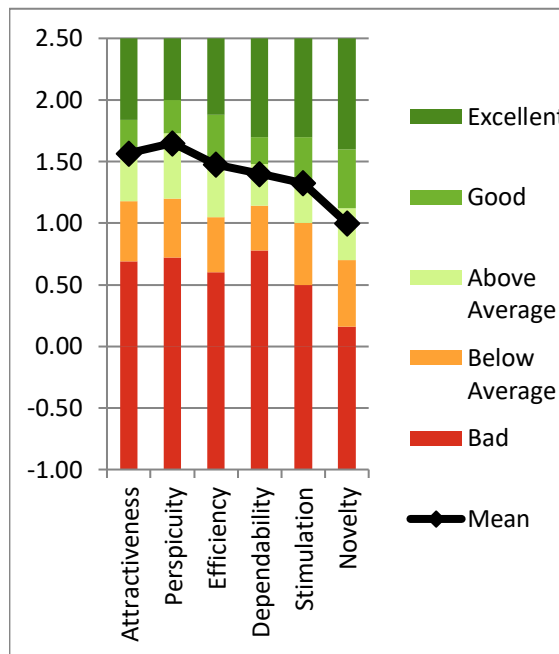


Figure 6. UEO benchmark results Chatbot app FAQ.

Figure 7 shows a comparison of the UEQ test results between Adisty and the FAQ Chatbot. Comparisons are made to the Means values of the elements that are used as references. Significant increase in Dependability and Novelty elements. Users find the Chatbot FAQ innovative and creative enough to fulfill their need for information.

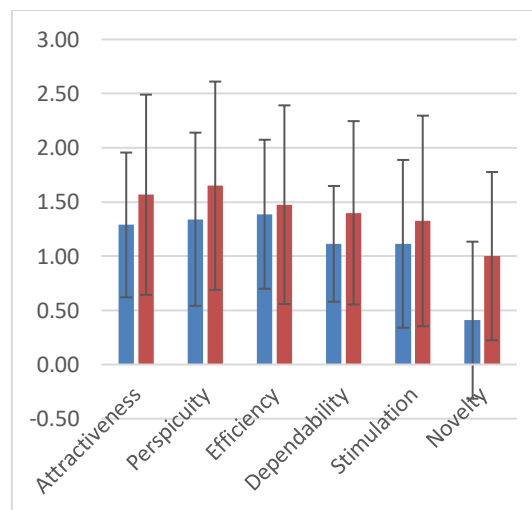


Figure 7. Comparison of Scale Mean values

## 4. Conclusion

Based on the research activities that have been carried out, a Hybrid Conversational design has been produced to be applied to the Chatbot FAQ. The success of this design is also quite significant when viewed from the results of UEQ's testing of Adisty and the FAQ Chatbot. FAQ Chatbot can improve user User Experience to Good for the five elements measured. Attractiveness is

the most important element to improve because it describes the impression the user feels while using it. However, this research has not tested the overall system performance. Another factor that needs to be measured is the accuracy of the application of Artificial Intelligent and Natural Language Processing. So not only from the point of view of the application of interface and interaction design, but from the side of functional quality it can also support the improvement of user usability.

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